



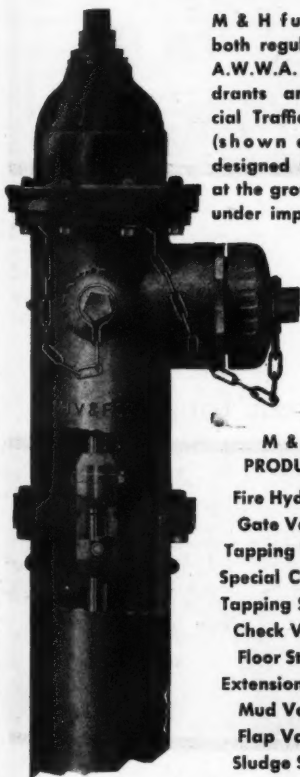
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Founded in 1896

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officials of cities, counties and states*

Vol. 75 No. 10

A. PRESCOTT FOLWELL, Editor

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### Published monthly by PUBLIC WORKS JOURNAL CORPORATION

Editorial and advertising offices: 310 East 45th St., New York 17, N. Y.

J. T. MORRIS, *President*; CROXTON MORRIS, *Treasurer*; A. PRESCOTT FOLWELL, *Secretary*.  
*Advertising representatives*: New York: ARTHUR K. AKERS, *Advertising Manager*; Chicago:  
LEWIS C. MORRIS, 612 No. Michigan Ave., Chicago 11, Ill.; Cleveland: ALONZO HAWLEY,  
326 Bulkley Building, Cleveland 15, Ohio. SUBSCRIPTION RATES: U.S.A. and Possessions,  
Mexico and Cuba, \$3.00; Canada, \$3.50. All other countries, \$4.00. Single Copies, 35 cents  
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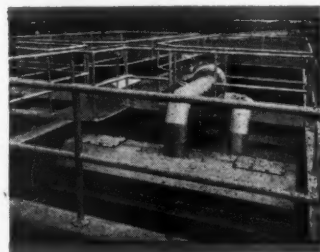
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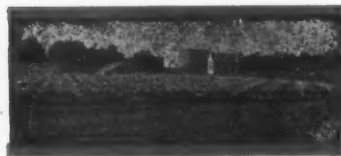


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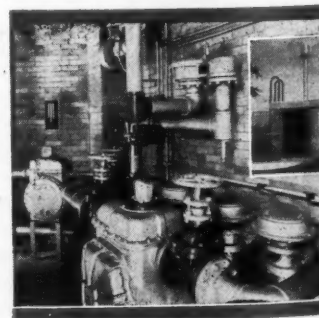
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# THE WAR EMERGENCY



## When Germany Has Been Defeated

"There will be only one preference rating, in addition to the present emergency AAA rating, and this rating will be reserved exclusively for military programs during the war against Japan. All other production will be unrated. After Germany's collapse no programming of civilian production will be necessary. The information which the War Production Board has on the available supplies of materials, components, facilities, and manpower indicates that maximum civilian output can be achieved without detailed priorities regulation from Washington."

This is a statement made in September by the War Production Board.

Reinforcing steel and structural members can be obtained in a reasonable length of time. Ample supplies are expected within a few weeks after Germany asks for peace.

Lumber is the most critical material at present and will continue to be for some time.

Portland cement is ample and should continue to be. The same is true of aggregates, unless for certain local shortages. Mixers will probably be plentiful.

Concrete, cement asbestos, clay and cast iron pipe are now generally plentiful and will continue so. Steel pipe, now available in limited quantities, is soon to become more plentiful. Present shortage of corrugated metal drainage pipe is not to be relieved soon because of war demands that will continue.

Copper tubing is still frozen, but homeowners may now replace wornout pipe with new copper conduits. Due to military requirements taking 90 percent of present copper output, army cutbacks will release large quantities of copper for production of civilian needs. This condition is expected to make ample copper building supplies available a few months after Germany collapses.

As for equipment, a short time after Germany collapses, order L196 of the WPB, which controls transfer of used shovels, cranes, crawler tractors, and motor graders, probably will be removed because new equipment is expected to be available.

Repair parts, tight for the last six months, are beginning to ease and the only really tight parts are roller bearings, fractional horsepower electric motors, and those parts needed for repair of engines and gear shafts. The picture is expected to improve.

Supplies of cranes, both truck and tractor mounted, are exceedingly tight, but with the greatly increased production facilities should become plentiful as soon as the army demand decreases.

## Fifth Annual Sewage Works Meeting

The program of the fifth annual meeting of the Federation of Sewage Works Associations in conjunction with the 17th Annual Conference of the Pennsylvania Sewage Works Association must make every one interested in sewage treatment wish to be

present. Even the superintendents of sewer systems are offered an entire session devoted to the "Operation of Sewerage Systems."

An interesting feature of this program is the prominence given to disposal of industrial wastes. The committee which reported a few weeks ago upon "Research Projects Under Investigation and Requiring Study" (see The Sewerage Digest in this issue) called attention to the increasing interest in this subject, and this has been recognized by those who prepared this program. Of eight papers dealing with treatment, six are devoted to industrial wastes.

Fifty years ago industrial wastes were seldom given a thought in considering sewage treatment. Land treatment was the common method, disposal of putrefactive domestic wastes was almost the only object aimed at, and unless fat or other matters in the sewage tended to clog the soil no attention was paid to them. But the amounts and variety of industrial wastes reaching sewers has increased enormously, and the nature of chemical, physical and biological actions in sewage treatment have been studied scientifically. If sewage were solely domestic wastes, the problem would be much simpler and would vary little from plant to plant. But it is not, and instead of industrial wastes being scarcely considered, they have, in many communities, become the chief problem, the domestic sewage being a constant amenable to standard practice. We may therefore expect to see the study of treatment of industrial wastes receive increasing attention during the immediate future.

## Surplus Army Incinerators Available

Thirty-four specially designed incinerator plants are being offered for sale by the United States Treasury Department. According to the announcement, the unused incinerator plants have a capacity of 2,000 pounds per hour. Each unit includes hot water coils, water storage tank, 33-foot chimney, induced draft equipment including diesel engine, a supplementary oil burner system and miscellaneous accessories.

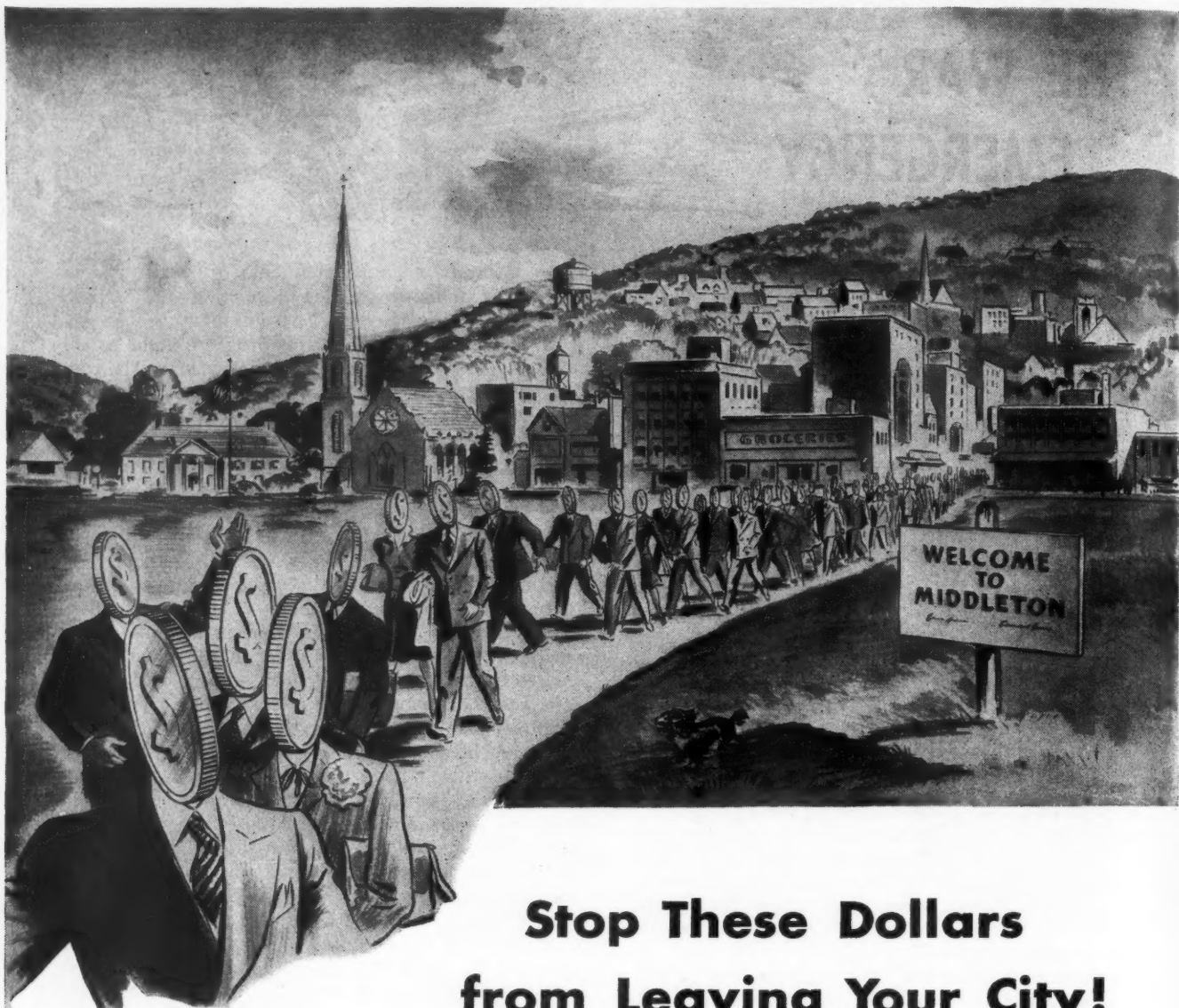
The equipment is stored at the Albany, New York Engineer Depot, and prospective purchasers should contact Mr. F. F. Albrecht, Regional Director, Treasury Procurement, 50 Church Street, New York.

In addition to incinerators, the Treasury Department also has advised of the immediate availability of 30,000 assorted surplus Army vehicles (2,000 passenger cars, 9,000 motorcycles, and 19,000 various types of trucks). Cities in need of any such equipment should communicate with their Regional or District Offices of the War Production Board, or Petroleum Administrator for War, or Office of Defense Transportation. These field offices are authorized to issue certificates up to the number of vehicles available.

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Yellow figures show the number of sewage treatment projects reported to Public Works by city engineers in each of the states. Details are given in the article.

## Postwar Sewerage Construction

**More than 1300 million dollars to be spent on sewerage and sewage treatment plants. Estimated from figures supplied by city engineers and the U. S. Census Bureau.**

SEVERAL weeks ago PUBLIC WORKS sent questionnaires to the engineers of about 3,000 cities and towns of 5,000 population and over, one set of questions on which related to proposed postwar sewage plant construction and additions. By September 20th 972 questionnaires had been returned, and these have been classified and tabulated and the data used in this article are based on this number. Others are coming in daily but it is not believed that they will appreciably change the picture.

Of these 972 communities, 204 expect to make extensions or changes in existing plants and 129 to build

new plants; a total of 333, or a little over one-third of the total number reporting.

In doing this work they expect to spend \$214,635,000, about equally divided between new plants and changes to old.

If we assume that the average conditions reported by these 972 municipalities obtain in the entire 3,000, we have an estimated \$662,000,000.

This is for treatment plants only. We have no data for sewerage systems, but considerations of past construction work and recent expansion of communities lead us to believe that at least an equal amount will

be spent in the construction of such systems.

Two checks on this estimate have been made: one a "Report of Proposed Post-War Public Works" prepared for Congress by F.W.A. in collaboration with the Bureau of the Census, the data being as of July 1, 1944. The other is a table of "Post-War Construction Plans Under Way or Completed" prepared by a committee of the American Society of Civil Engineers, dated September 8th 1944.

The latter shows a total of \$456,089,000 for plans "under way or completed." The reports to us by city engineers include also projects which have not advanced to that point, and which presumably considerably exceed those that have reached the planning stage. It also appears from this table that the advanced sewerage projects constitute more than 11% of all proposed construction of all kinds, both public and private, including highways. Also, sewerage work exceeds water works projects by 78%.

Turning now to the Federal report, we find that the figures for Sewerage and Water are combined; also that they are divided into four classes—Plans completed, being designed, preliminary, and in the "idea" stage. In the case of sewerage and water, about 9% are in the first class, 16½% in the second, 30% in the third and 44½% in the fourth. The total for sewerage and water in all four classes is \$2,799,518,000. If we assume that the estimates for sewerage and for water bear the same ratio to each other as in the case of the A.S.C.E. figures, we have a total of \$1,791,691,000 for sewerage alone. This is 24% of the total estimate for all kinds of public work.

This includes sewerage systems as well as sewage treatment. Our estimate for both is \$1,325,000,000. Considering the difficulties and uncertainties in making such estimates, the agreement is closer than would be expected. An average of the two, or 1½ billion dollars, would seem to be as close an estimate as can be made.

### Details of the Proposed Projects

A summary of the data, combined by states, is given herewith. Where any details of the projects were supplied, these are included and make an interesting study. For example, many cities find it desirable to add grit chambers to their existing plants. Several northern cities hope to put greenhouse covers over their sludge beds. More find their sludge bed capacity inadequate.

Most prominent are the figures showing the desirability of increasing the plant capacity. Considering the time it takes to plan and build a plant and the advantage of having some factor of safety in capacity, provision as soon as possible for treating the sewage flow estimated for 1950 seems desirable. With this idea as a basis, we find only a few plants with adequate capacity. More than half of them need to be enlarged 30% to 50%. A considerable number must be treating only a part of the sewage of the municipality, or else providing hardly appreciable purification. Here is the greatest problem for plant operators—to convince the taxpayers and officials of the necessity of providing them with facilities adequate for the job they are expected to do.

### New England States

Four Massachusetts cities report expecting to improve their plants and five to build new ones; the former at an estimated cost of \$150,000, while the estimated cost of four of the new plants is \$1,450,000. Of those reporting on their plant capacity, all but one were within 10% of the 1950 requirement, and new

work consisted of improvements rather than enlargements.

In Connecticut, plans are reported for enlarging seven plants, and of building three new ones at a cost of about \$1,000,000. Capacities of plants in seven cities are 78,150,000 mgd, with 129,850,000 mgd required by 1950—an average increase of 66%. Among the planned improvements are covering sludge beds in two plants, grit chambers in two plants, digestion tanks in two.

Two Rhode Island cities expect to enlarge their plants, one by adding more drying beds, the other by addition of a trickling filter.

### Middle Atlantic States

In New York State, 22 cities have reported that they expect to enlarge their present plant or build a new one. New York City, which now has plants with designed capacities totaling 400,000,000 gpd, expects to construct three new plants estimated to cost \$25,000,000, and complete one that now gives partial treatment only. Of the other 21 cities, 13 expect to spend an estimated \$1,833,000 on plant extensions, 5 have made no estimate of the cost of proposed extensions, and four which have no plants now expect to build them at an estimated cost of \$1,450,000. The improvements planned include sedimentation tanks in 8 cities, sludge collectors in existing tanks, digestion tanks in 4 cities, filter beds in 2, vacuum filter in 1 (capacity 1.4 mgd), grit chambers in 2, pumps in 3.

Sixteen New Jersey cities have reported plans for extensions to existing plants. Ten of these are estimated to cost \$1,375,500; the other six gave no estimates. Three expect to build new plants. Among the interesting items are screenings ejector and incinerator and vacuum filter for Tenafly.

Eight Pennsylvania cities contemplate plant extensions, six of the estimates totaling \$599,500, in addition to Philadelphia's \$42,000,000 program. Also four new plants are estimated to cost \$750,000. One city plans covers over two sludge drying beds; another to increase its air supply; a third, a gas storage tank and collector mechanism in an existing settling tank.

In these three Middle Atlantic states, of the 33 cities reporting on plant capacity, eight report that their present capacity is sufficient for the population anticipated for 1950; three that it is more than sufficient. But the other twenty-five—about 75% of the total—fall below this, some of them far below. One with capacity for 2 mgd requires 25. Other figures are: present 150,000, needed 1,500,000; present 1,500,000, needed 4,500,000. In the majority of cases an increase of 30% to 100% is indicated. The totals for the 33 cities are: present capacity, 451.4 mgd; required for 1950, 695.3 mgd.

### South Atlantic States

In Florida, three cities expect to spend a total of \$508,000 in extending their plants. Miami expects to build a new plant estimated to cost about \$5,500,000. Two smaller cities also expect to build plants. Due probably to war population increases, capacities of many Florida plants are greatly inadequate. Eight cities giving capacity figures have a combined plant capacity of 28,225,000 gpd and estimate that this should be increased to 65,800,000 by 1950.

One Georgia city expects to enlarge its plant at a cost of \$250,000, another to complete an unfinished plant at a cost of \$25,000.

Two Maryland cities expect to spend \$51,000 con-

(Continued on page 40)



Main Street, Burlington, the day following an application of salt.

## How Burlington, Vermont, Handles Its Snow and Ice Problems

**Equipment used for keeping 75 miles of streets open and cleaning the municipal airport runways. This was greatly facilitated last winter by use of rock salt.**

**By GEORGE C. STANLEY**

**City Engineer, Burlington, Vt.**

THE severity of the season's first snow storm which struck Burlington, Vermont, November 22nd, 1943, called attention to the necessity for getting all possible help this winter to keep traffic moving. Winter's first attack—the heaviest initial storm in 37 years—consumed almost a third of the \$20,000 winter maintenance budget. Removing 22 inches of snow proved costly, and when cold weather set in we had not succeeded in clearing away the deposit completely. Frozen accumulations hampered operations, icy ruts developed in spite of the overtime the crew of 30 men piled up.

In all, there are 75 miles of streets to be kept open with plows, and sanded where necessary. For this task there are approximately 50 pieces of equipment—20 trucks, 10 of which are equipped with blade plows; 1 bulldozer with a straight blade and an angle blade used to pile up snow when hauling; 4 sand spreaders, and 1 Sno-King Rotary Loader; also 4 Allis-Chalmers rubber-tired tractors equipped with "V" sidewalk plows and trailer-type sand spreaders designed and built in our own shops.

Because Burlington is Vermont's largest city, the shopping center of the northern part of the state, it is necessary to provide parking space in the business district quickly. Most of the plowing, piling and removal with the snow loader is done during the night when there are fewer cars abroad. Motorists are urged not

to leave their cars on the streets all night but cooperation is not satisfactory, due to the absence of a proper ordinance to prohibit all-night parking.

The large volume of snowfall last winter did not permit as prompt removal as was desirable because our equipment is requisitioned for double duty. Clearing the municipal airport runways consumes a large part of the time of several plows, also of our Sno-King rotary plow for blowing the banks off the shoulders of the runways and taxi strips. With this extra work, the equipment has been heavily taxed, making breakdowns inevitable. While the machines are repaired quickly in our own completely equipped shops, nevertheless considerable time has been lost.

Applying rock salt to twenty miles of the principal streets, and U. S. and state highways traversing the city has greatly facilitated maintenance work since this technique was employed. Shortly after the new year began, crews spread salt on the compacted snow and rutted ice and in a short time the ruts were smoothed out and bare pavement obtained.

Encouraged by this success, we followed salt engineers' recommendations and spread the equivalent of  $\frac{1}{4}$  pound of grade CC salt per square yard of pavement surface, before the next storm had deposited more than two inches of snow on the streets. This prevented ice formation and even better results were se-





The 2½-ton truck for spreading salt. Man is seen shoveling salt into the hopper of the spreader attachment, which spreads it along the crown of the street.

curd than by using salt to melt off an ice-coated street.

From scrap sheet metal and a piece of two-inch pipe, two simple spreaders were made in our shops. These can be quickly attached to the left hand side of the trucks when needed. Another pipe is telescoped over the short piece attached to the hopper. By the use of a chain which is adjustable, the distance from the lower end of the pipe to the ground can be regulated, depending upon the elevation of the side board of the truck used and the depth of the snow. With the end of the pipe 15 to 18 inches above the road surface, there is sufficient drop to allow the salt to roll slightly thus treating the center strip of roadway for a width of 6 to 8 inches.

At the storage yard trucks are loaded with three tons of bulk rock salt. A ton of salt will occupy almost exactly a cubic yard of space. One man with a shovel can replenish the hopper as the truck travels along at a speed of 15 to 18 miles an hour. With the salt spreader attached to the left side of the truck it can stay in its own traffic lane without slowing down traffic while spreading 350 pounds of salt per mile.

This arrangement permits two trucks to apply salt to all the principal streets in an hour's time, before the snow has had a chance to pile up too deeply. As the salt crystals dissolve, pitting the snow, an anti-freeze solution is formed which keeps the snow layer close to the pavement from freezing fast. Even if the temperature drops far below 32° or there is a very heavy subsequent fall, when the plows come through they can easily remove the mealy snow almost down to the pavement. The salt quickly melts the small amount of snow the plow blade did not reach, leaving a bare pavement, dry and safe.

When the salt trucks were unable to get out until a heavy blanket had fallen, plows removed all but an inch or so of the snow and salt was applied to freeze-proof the remainder. When the compacted layer was thus broken up, a second trip of the plow completed the job. Since the action of the rock salt is faster when the temperature is above 15°, it has been found best to take full advantage of the warmer interval that usually follows immediately after the storm, by getting the biggest part of the plowing done. The defense area has high priority.

At convenient locations throughout the city, 175 emergency sand boxes have been put out. These boxes hold approximately one cubic yard each and are covered. The sand used in these boxes is dehydrated by running it through the asphalt dryer to prevent it from freezing. Sand is used on grades, curves and intersec-

tions. Four rotary-disc spreaders attached to the tail gate of the dump trucks take care of putting down abrasives without the expenditure of a great amount of labor.

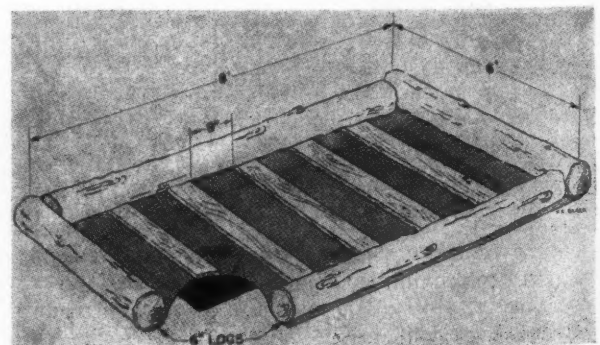
The use of salt made possible the elimination of abrasives in the business district as well as on the through streets last winter, and this represents a saving because in this section, in past winters, great quantities of sand had to be spread at frequent intervals to keep the snow and ice from becoming too slippery. Since the cost of spreading sand is about the same as a salt application, and the salt requires merely a single treatment to secure bare pavement, expenses have been cut wherever used. Another saving was effected because it was not necessary to clean the sand from the gutters in the spring or clean out catch basins and drains, which previously became clogged by abrasives, salt being completely soluble.

In spite of the severity of last winter (having had 26 sub-zero days up to March 1st, with a total snowfall of over 5 feet), there were fewer complaints and the local press and business people remarked that the maintenance, even under handicaps, was an improvement over previous years.

### Mat for Covering Garbage Sump

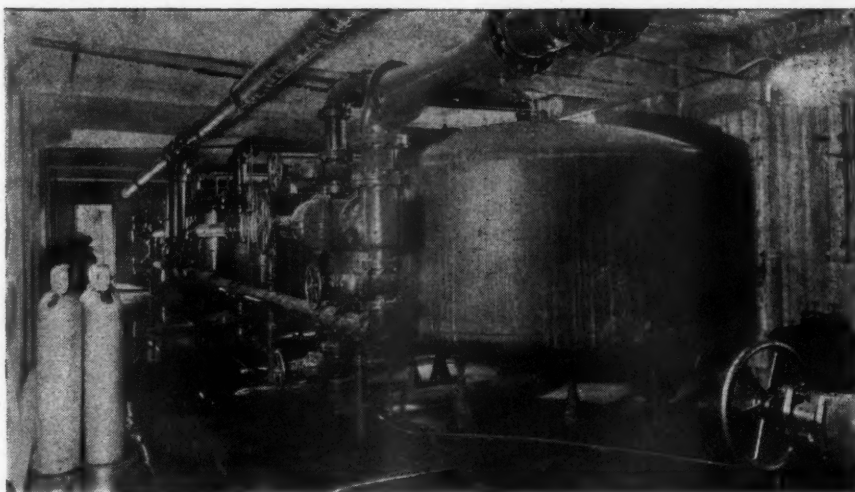
A mat, the purpose of which is to reduce the number of flies caused by a garbage sump in an Army camp, has been improvised by Captain Maurice B. Johnston, M.C., of the 78th Medical Battalion, Armored, and is described as follows in the *Bulletin of the U. S. Army Medical Department*.

"The garbage sump is constructed according to standard practice and the needs of the particular situation. The mat cover is constructed from salvaged canvas and strips of lumber and four logs. The canvas was made 9 feet long by 6 feet wide to cover satisfactorily a sump 6 feet long by 4 feet wide. These dimensions are arbitrary. The size of the canvas may be modified to conform to various sizes of garbage sumps. Each end of the canvas is tacked with roofing nails to logs cut to the same length as the width of the canvas. Batten strips of lumber 72 in. by 2 in. by ½ in. are tacked crosswise to the canvas at about 9-inch intervals throughout its length. These battens prevent the canvas from sagging. By rolling a log at either end, the canvas is rolled up on the log and the sump area is exposed. Two logs are laid lengthwise along the sides of the canvas to anchor it securely to the ground. By spraying the sump with one of the many suitable spray materials and keeping the mat in place, flies can be greatly reduced in the company area. The use of the cover also increases the capacity of the sump by eliminating the dirt cover usually spread over each deposit."



Construction of garbage sump mat.

Five vertical Graver filters built in 1941 for a municipal swimming pool.



## A Study of Recent Water Treatment Plants

Methods and devices used in 474 plants constructed since 1940 by communities of all sizes, grouped by sizes and by geographical districts.

*Concluded from the September issue*

Iron removal plants, as such, are seen to vary inversely with the population. The explanation of this, presumably, is that the same is true of ground water supplies. (See the July issue.) As about 70% of these new supplies were ground water and 18% of the plants were for iron removal, the indication is that about one-fourth of such waters need iron removal treatment; but in Ohio, Indiana, Illinois and Iowa, about 75% of the supplies were ground water, and 40% of the plants included iron removal—a little more than half of them in that particular section. In fact, 74 of the total 85 iron removal plants constructed by all the cities were in the E.N.C. and W.N.C. states.

Softening followed much the same pattern as iron removal—70 of the 99 plants were in the E.N.C. and W.N.C. states, the remaining 29 plants being scattered over all districts except the Mountain.

Aeration also was more popular in the two North Central districts than elsewhere, but was included in more than 18% of the plants in all the districts except the Middle Atlantic. Population did not seem to be a factor.

The use of activated carbon seems to be the one most affected by population, the percentage of use varying quite closely as the population for all groups except F. Geographically, the South Atlantic and West South Central districts led in its use, while the least use was in New England—one plant in 38. In fact, New England showed about the lowest percentages in all types of treatment except use of chlorine and ammonia, correction for corrosion, and recarbonation.

In filtration there was comparatively little variation in either population groups or geographical districts. By population groups, with an average for all plants of 55.9%, the lowest group average was 50% and the highest 78.6%. By geographical groups, the minimum percentage was 34 for both the New England and Middle Atlantic states, and the highest was

about 73% for the South Atlantic and East South Central. In the two North Central districts about 60% employed filtration, and about 44% in the West South Central and Mountain districts. These figures are exclusive of the Pacific district, in which there were but 4 plants, only one of which included anything other than chlorine and ammonia and corrosion correction.

Chemical treatment for corrosion correction or water stabilization was affected by size of community less than any other treatment. The minimum percentage was 21.4 for Group A and the maximum 31.8 for Group F. Geographically there was more difference, varying from 47.2% in the South Atlantic states to 4.8% in the West South Central and none in the Pacific states.

All the percentages would be much higher if we omitted from the calculation all places that use disinfection only. There were 28 such in Pennsylvania alone, and 153 of the entire 474 plants were for disinfection alone (including the few that used ammonia also). Therefore the averages for the entire country (except those for D and N) would be increased by about 1/3 if these plants were omitted from the calculation.

### Details of Treatment Devices

Of perhaps equal interest is a study of the kinds of each type of treatment or device. For example, aeration may be effected by overflow trays or other splash aerating device, by contact beds, spray aerators, or patented devices. Unfortunately these figures are not complete, as a number of reports did not specify all these details. (As in the case of all other figures given in this article, those given here refer only to plants built in 1941 and 1942.)

### Aeration

In Group A, aeration in contact beds is the most popular method, being used by 32 of the 59 plants practicing aeration; splash aerating devices are used



in 15 plants, patented devices in 3, spray aerators in 1, and 8 are "other types."

In Group B, 32 aeration plants, 15 use splash aerating, 14 contact beds, and one case of each of the others.

In Group C, 10 aeration plants, 3 of them use contact beds, 3 patented aerators, 2 splashing devices and 2 spray aerators.

In Group D, 14 aeration plants, 2 use contact beds, and splashing devices, spray aerators and patented aerators are each used by 4 plants.

In Group E, 4 plants, 3 use spray aerators and 1 a splashing device.

The one Group F plant uses a spray aerator.

Of the 121 aerating plants in the entire country, 51 adopted contact beds, 38 splashing devices, 12 spray aerators, 11 patented aerators, and 9 other devices.

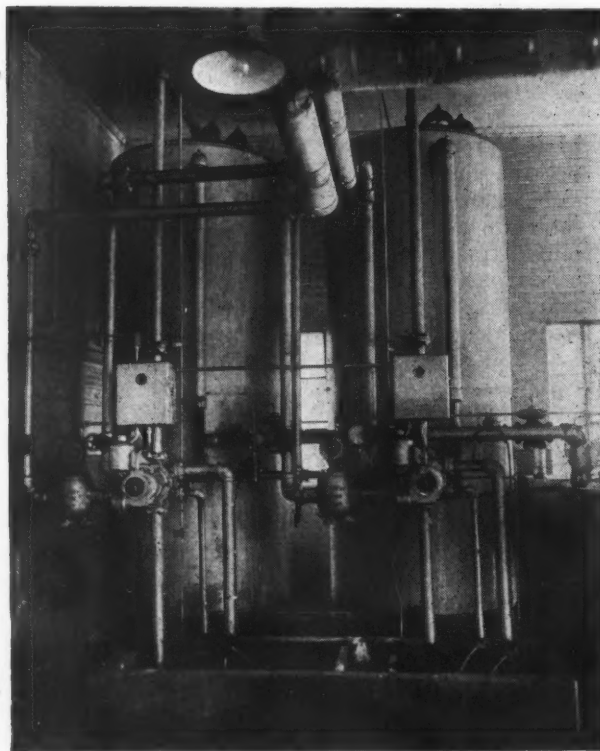
#### Chemicals for Coagulation or Softening

Many of the 176 plants reporting use of chemicals for these purposes use more than one kind. For example, 132 use alum and 138 use lime, but with few exceptions the same plants report both. Soda ash is used in 24 plants, iron salts in 6 plants, and other coagulants in 10 plants. Of the six plants using lime but not alum, 4 are in Group A and 2 in Group B. Users of iron salts are found 1 in A, 1 in B, 2 in D and 2 in E. Users of soda ash are 10 in A, 3 in B, 3 in C, 7 in D and 1 in F.

#### Sedimentation Basins

Although 190 plants reported using sedimentation, only 75 told what kind of basin was used. As between open and covered, 34 reported the former and 32 the latter; and of the 32 covered, 24 are in the small Group A plants (because the tanks are smaller?) and only 6 open tanks in that group. No covered tanks were reported by Groups C, D or E.

Mechanical sludge removal was included in only 3 of the 30 tanks of Group A, and 2 of the 17 Group B tanks, but in 2 of the 8 Group C tanks, 4 of the 7 Group D, both of the Group E and 2 of the 4 Group F.



Courtesy Permutit Co.

Automatic zeolite water softener installed by the city of Traer, Iowa.

Baffles, other than inlet and outlet baffles, were constructed in the basins in 22 plants, increasing from 5 in the 30 A plants to all in the D and E plants, but none in the F group.

Upward-flow cylindrical tanks were installed in 7 plants, 2 of Group A, 1 of B, 3 of C and 1 of D.

#### Mixing Device or Tank

Here, as in other cases, there is more or less duplication, both rapid and slow mechanical mix being used in the same plant. Rapid mechanical mix was reported by 20 plants, baffled mix by 35, slow mechanical mix by 62, air agitation mix by 8, hydraulic mixing by 6, and patented sludge blanket mixing by 16. In Group A, half the plants employ slow mechanical mix, and in Group B nearly half. Tanks using the patented sludge blanket were adopted in 4 plants of each of the Groups A, B and C, 2 of Group D and 1 of each of the other groups. (Teutopolis, Ill., Group A, reports installing a "Spiractor".)

#### Filters

Of the 264 plants reporting construction of filters, 164 adopted gravity rapid sand filters and 12 slow sand filters, all of the latter being in the four Groups A to D. Pressure sand filters were installed by 52 of Group A plants, 18 of Group B, and 1 of Groups C, D and F.

There were 40 zeolite filters, 26 in Group A, 9 in B, 1 in C, 2 in D, 1 each in E and F.

Contact or roughing filters were included in 2 plants of Group A and 1 of B.

Durand, Ill., used "Birm" filter medium, Hartford, Ind., used anthracite. Three small camps in Florida installed pressure carbon filters; which were used at Dalton, Ga. Also, Bismarck, N. D., installed a mechanical screen.

#### Disinfection

Disinfection was obtained by use of liquid chlorine in 237 cases and by hypochlorite in 111. Three cases of use of "other means" (ozone?) were reported, 2 by Group A and 1 by Group C.

Of the 111 plants using hypochlorite, 78 were Group A (of which 29 use liquid chlorine); 26 were in Group B (of which 104 use liquid chlorine); and only 7 were reported by the other four groups. Apparently a population of between 5,000 and 10,000 is the upper limit for the use of hypochlorite under ordinary conditions.

At Beckley, West Virginia, Group D, breakpoint chlorination is used for taste control and color removal.

#### Ammoniation

While 54 plants reported the use of ammonia, only 28 stated whether it was applied as  $\text{NH}_3$  gas or as an ammonium compound, 25 reporting the former and 3 the latter. Ammoniation was reported by no plant of Group A, by 8 of Group B, 6 of C, 3 of D, 4 of E and 7 of F.

#### Corrosion Correction or Stabilization

Chemical dosage for corrosion correction or water stabilization was reported by 123 plants, of which 104 named the chemical used. Alkali feed for pH adjustment was reported by 56 plants, phosphate compounds by 35, sodium silicate by 4, chlorine gas by 5, and hypochlorite by 4.

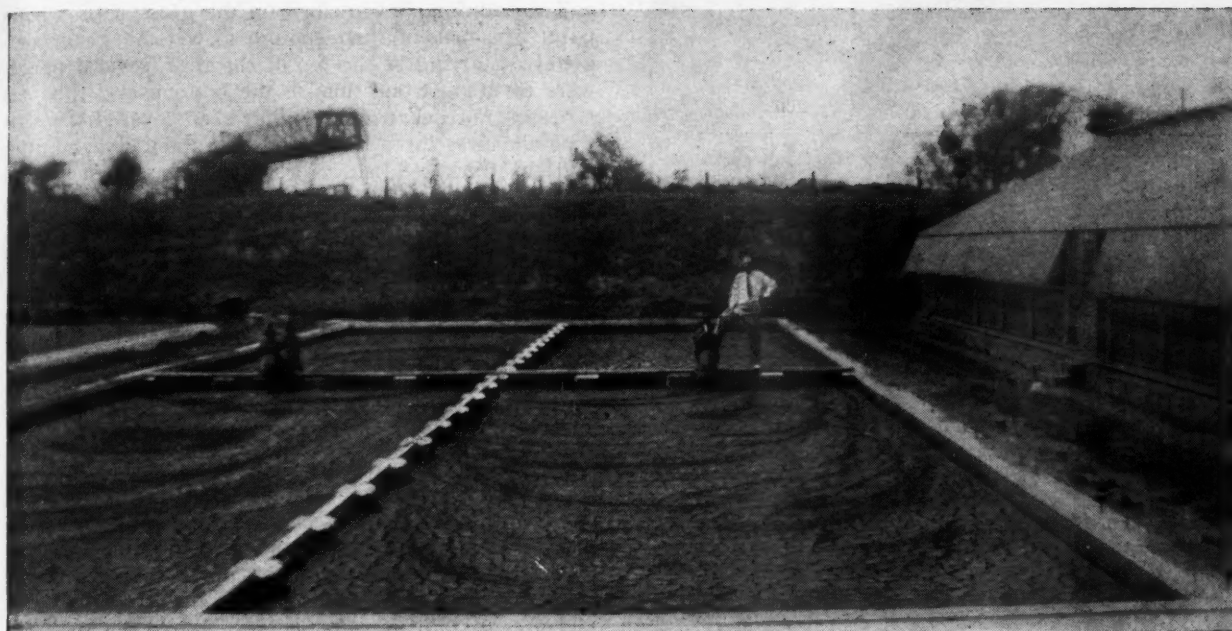
Alkali feed was reported by 10 plants of Group A, 19 of B, 8 of C, 8 of D, 4 of E and 7 of F.

Phosphate compounds were used by 3 of Group A, 21 of B, 6 of C, 4 of D and 1 of F.

Sodium silicate was used by 2 of A, 1 of B and 1 of C.

Chlorine gas was used by 1 of A, 3 of B and 1 of D. Hypochlorite was used by 2 of A and 2 of B.





Massillon's sludge beds; open bed finished in 1939. Same size of beds under glass at the right. Gantry crane in the background used to charge blast furnaces, hidden behind plant levee.

## Cleaning Glass Greenhouse Covers Over Sludge Drying Beds

**Glass so covered with dust from blast furnace as to almost double the drying time. Plumbers' solvent used for removing the film when other methods failed.**

**By R. F. SNYDER**

*Sanitary Engineer, City of Massillon, Ohio*

**T**HE MASSILLON, Ohio, sewage treatment works, placed in operation in October, 1937, is designed for primary treatment with separate sludge digestion and final drying on covered sludge drying beds. Chemical treatment units are provided for seasonal operation when the flow in the Tuscarawas river is low and a higher degree of treatment is required.

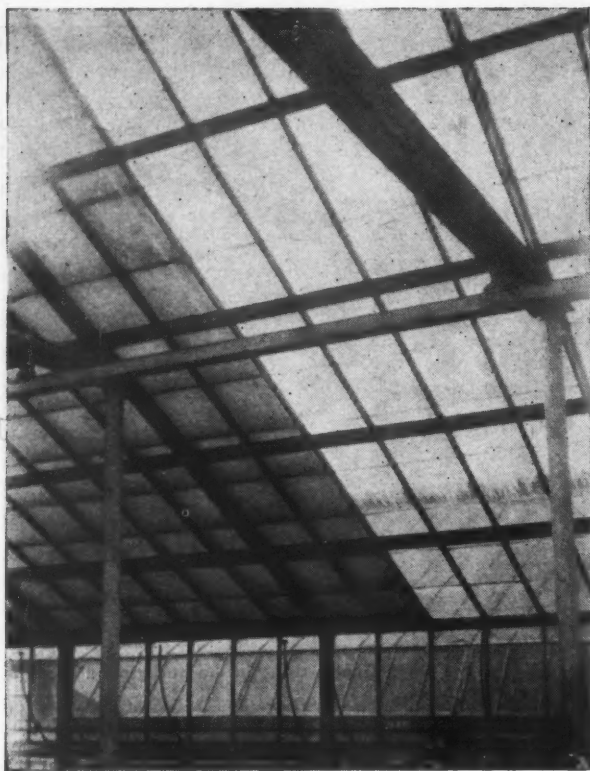
In the northern part of this state, where Massillon is located, the use of glass greenhouse covers over sludge drying beds is considered economical and more efficient in sludge drying, since the amount of sludge per year dried under glass is about 35% greater than can be dried on open beds. The drying season begins earlier in the spring and extends later in the fall, and with an average rainfall of approximately 39 inches per year the glass covers prevent the partially dried sludge from being saturated again and thus requiring longer periods of time for the same volume of sludge to dry than if it were on open beds exposed to rain and snow.

In the spring of 1939 additional drying beds were constructed by W.P.A. labor because money had not been available to build all that were needed when the plant was constructed in 1937. Glass covers were not installed on these new units for the same reason, lack of funds, although anchor bolts were set for installing them when possible. When these units were in operation we had three units of four beds each

under Lord and Burnham glass greenhouse covers and three units duplicate in size but without the glass covers. When operating both open and covered beds at the same time, the value of the glass covers can be determined very readily when a complete record of operation is kept for each bed.

When war production stimulated manufacturing industries throughout the country, a blast furnace directly across the river from the treatment works began working to capacity night and day, giving off heavy, dense clouds of red ore dust and dirt, which the prevailing winds carried to the treatment works. Sidewalks and structures, including the glass greenhouse covers, have at times been so heavily covered that one could stomp his foot on the walk and the rush of air from under it would form there an outline of the shoe sole. When this occurred in the day time in dry weather the wind would eventually blow the dust from the glass covers; but if it occurred when the glass was wet with dew, the moist dust would be baked on by the sun the following day and neither rain and snow nor regular washing had any effect on this film.

Operating conditions became such that, instead of getting 30 to 35% more dryings from the covered than from the open beds, we were getting about 25% less. Various commercial window cleaning compounds were tried with no success, and it was only with some effort and rubbing that we could cut the film with



Glass cover over sludge beds. At the left, uncleaned; at the right, after cleaning.

scouring powder or steel wool. Muriatic acid would cut it quickly and effectively but not if diluted to the point where it would not harm the paint and supporting framework, to say nothing of a man's skin or clothing. The cost of removing the panes of glass, dipping them in acid, rinsing and replacing them would be prohibitive. We considered removal and resale of the glass covers and operating the beds as open units, but continued to struggle along with them, since we have plenty of lagoon area where we can pump all excess sludge that cannot be dried on the beds.

Last year a plumber who came to buy sludge observed the condition of the glass and said he had something that would clean the glass quickly and effectively and would not affect the paint or framework, nor injure skin or clothing of the workmen if handled properly; and proved it by a demonstration.

The product used was Nu-Coil, manufactured by the Skasol Corporation of St. Louis, which was developed for removing lime scale and other deposits from hot water heater coils, diesel and gasoline engine water jackets and similar piping; being preferred for these purposes by plumbers instead of muriatic acid because of the corrosive action of the latter.

In cleaning our glass-covers with this we found a single-section 20 ft. ladder, the length of the slope of the roof, very satisfactory. This was laid flat on the roof, held in position by a support at the top hooked over the top of the ventilator sash frame. Cleats were nailed to the under side of the ladder of such length and at such points as to bear on the glass rails at their points of support on the steel framework, so that no weight was placed on the glass. The ladder, being light in weight, could easily be moved along the roof as the work progressed. We started at one end of the roof, cleaning about three panels of glass from top to bottom at each position of the ladder.

The solution was brushed on the glass with a wide paint brush, using just enough to wet the glass completely. Starting at the top of the roof, several panels were covered at one time to the bottom, and this was repeated until seven panels had been covered. By this time the first three had stood for about five minutes and the dark reddish color of the glass had turned to a pale green, indicating that the film had been loosened. These panels then were washed down with water, beginning at the top of the roof, using a hose brush similar to those used in washing train windows, truck bodies, etc., which had a tubular handle six feet long to which a hose was attached and through which the water passed to the head of the brush. (The one we used was made by the Milwaukee Dustless Brush Co.) The loosened film washed off easily and no hard brushing was necessary.

The ladder was then moved over three panels and the procedure repeated, three panels being brushed with the solution and three washed down at each position of the ladder. With two men working, one applied the solution from one side of the ladder while the other, working below him, washed the treated panels. Since the washing progressed faster than the applying of the solution, no interference resulted from the two men working on the ladder at the same time.

The vertical side and end sections did not need cleaning, except the outward-opening side ventilator sections, and these could be cleaned from the ground.

An accurate record of the work could not be kept because the men doing the work were also operating the plant and were not on this work continuously, but a close estimate, including material and labor, was about  $1\frac{1}{4}$  cts per square foot of actual glass surface cleaned. It is believed that the cost could be reduced at least to  $\frac{3}{4}$  cent per square foot under more favorable weather conditions and with men who are not interrupted to do other work. Most of this work was done in the fall with the temperature at about  $50^{\circ}$ . When the temperature fell below  $45^{\circ}$  or  $50^{\circ}$  the reaction was slower and good cleaning was not obtained. When the weather was cloudy it was necessary to use more solution to obtain the same result. With temperatures of  $60^{\circ}$  or higher and the sun shining, the results were much better; the cleaning action was more complete, less solution was used, less time needed for the reaction of the solution, and a very light washing with the brush would remove the film.

This solution contains hydrochloric acid, but it had no effect on the skin or clothing of the men, who wore rubber gloves when applying it. Continued contact for a long time will slowly attack paint and putty but plenty of water was used in washing off the glass and supporting rails and so far as can be determined no damage was done. Various dilutions of the Nu-Coil were tried, but only the full strength gave satisfactory results. Spraying it on might be more economical but was not tried.

Only one of the three units has been cleaned because it was not known whether the value of the result under our present conditions would justify the cost of continued maintenance, since it was not known what intervals between washings would be desirable. We do not get as bad dust storms from the blast furnace as we did several years ago, but we may have three glass covers for sale if the time between cleanings is too short. Resale value of the covers plus cleaning costs and maintenance cost of painting the framework (no small item) may be sufficient to make it cheaper for us to build more open beds rather than keep on cleaning the glass.



# Highway Construction by Contract or Day Labor\*

**A study of the relative advantages and disadvantages, with comparison of costs on 53 projects. Public Works report on county road work.**

IN THE expenditure of funds for the accomplishment of public construction projects two principal methods are recognized. One of these is known as the "day labor method" and the other as "contract construction."

The best information available at this time on the relative merits of day labor and contract construction consists of statements by authorities whose chief occupation has been construction and of the results of comparative research on the two systems.

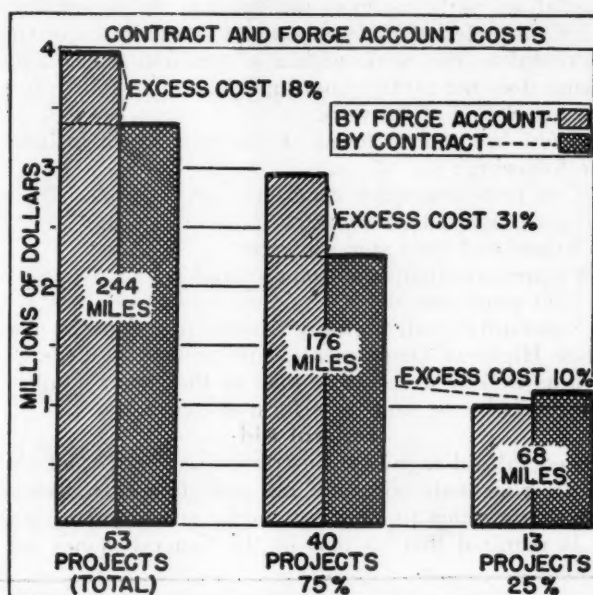
This report relates principally to highway construction and has for its purpose to define the contract and day labor systems, and to compare the advantages and disadvantages of each.

## Day Labor Method

Day labor construction is a procedure whereby a public agency itself undertakes the work with employees hired for the purpose. In this connection the terms day labor and force account may not be used synonymously although common usage makes no distinction between them. Force account is the term used under a contract to designate extra work done by the contractor for which no price was bid in the contract. Whereas, day labor is the term applied to construction that is accomplished by the owner with his own organization.

Advocates of day labor procedure claim that it saves the contractor's profit, that it readily permits changes in original design or scope of project without cumbersome negotiation, and that it enables the owner to maintain direct control of every feature of the operation at all times. However, day labor has several proved weaknesses which for the most part have limited its application to exceptional situations. In the first place it is highly vulnerable to political manipulation. In the second place no certain means are provided whereby ultimate cost of the completed structure can be fixed in advance. In the third place a construction organization recruited for day-labor work usually lacks the background of teamwork, experience and driving accomplishment which speedy and economical construction require.

The day-labor method may be used to advantage on public works where much employment must be given quickly and costs may not be an important factor. The day-labor method may be used on new or unusual types of construction, on projects of unprecedented size, experimental undertakings or projects for which



Comparison of cost of highway construction by force account and by contract. Results obtained from actual work in the field by state highway departments.

a schedule of work items cannot be set up. A number of major projects have been constructed by day-labor after bids were received and rejected including the Panama Canal, the Miami Conservancy District and certain locks and dams along the Ohio River.

Reasons advanced to justify day labor on highway work are better employment of common labor, proximity of supervisors and equipment operators living in the vicinity of the project, better use of local materials and saving in construction costs. It is believed by some that day labor construction can be carried on at a cost equal to that for contract construction provided projects adaptable to day labor are selected and competent supervision employed. Types of highway work adapted to day labor methods include clearing of right of way, clearing of ditches and culverts, improving shoulders, removal of obstructions to improve sight distance, widening curves, improvement of slopes, minor drainage construction, and resurfacing secondary roads.

In investigating costs of day labor construction all essential and appropriate items must be included if the true cost is desired. Essential items that sometimes are omitted include charges for overhead, depreciation of

\*Slightly condensed from a paper before the Highway Research Board by C. N. Conner, Senior Highway Design Engr., U. S. Public Roads Administration.



equipment, equipment rentals and other items of less importance.

Plans and specifications for new highway construction are well standardized. A large number of contractors are well acquainted with the requirements for highway construction. Consequently probable costs can be estimated in advance of the construction. Under the day-labor system, plans, specifications and detailed cost estimates usually are not available at the time of starting the project and the final cost may remain unknown until long after the work is completed.

#### Contract System Defined

Under the contract system a single construction agency assumes the full responsibility for the completion of the project. The contractor usually agrees to furnish all labor, materials, equipment required for the construction and to complete the work according to plans and specifications. The contractor also agrees to protect the owner from all losses due to damage suits, liens or other causes. He provides highly specialized skill, assumes the financial responsibility for the completion of the work, and is usually required to complete the work within a specified time. The owner does not assume any financial responsibility for the completion of the work.

There are several forms of contracts which include the following:

- Cost plus percentage contract;
- Cost plus fixed fee contract;
- Negotiated lump sum contract;
- Competitive lump sum contract and
- Unit price contract.

Substantially all highway construction done by the State Highway Departments, with or without Federal aid, as well as street work done by the larger municipalities is by the unit price form of contract.

#### Federal Aid

Federal aid highway construction is carried out by contract methods using the unit price type of contract. Under the rules and regulations for such construction it is required that no part of the Federal money set

aside on account of any project shall be paid until it has been shown that adequate methods, either advertising or other devices appropriate for the purpose, were employed prior to the beginning of construction to insure economy and efficiency in the expenditure of such money. An advertising period of two weeks may be accepted provided a suitable mailing list of contractors is maintained by a State Highway Department to whom notices of new work are mailed, and adequate public advertisement over a specified period is carried out.

Substantially all contracts for the construction of Federal aid highways require the contractor to furnish all materials entering into the work.

No procedure or requirement will be approved which is designed or may operate to prevent a submission of a bid or the award of a contract to any responsible contractor, whether resident or non-resident of the State wherein the work is to be performed. Federal legislation and regulations are specific with regard to highways constructed with Federal aid and they are recommended for study and use.

#### Prequalification

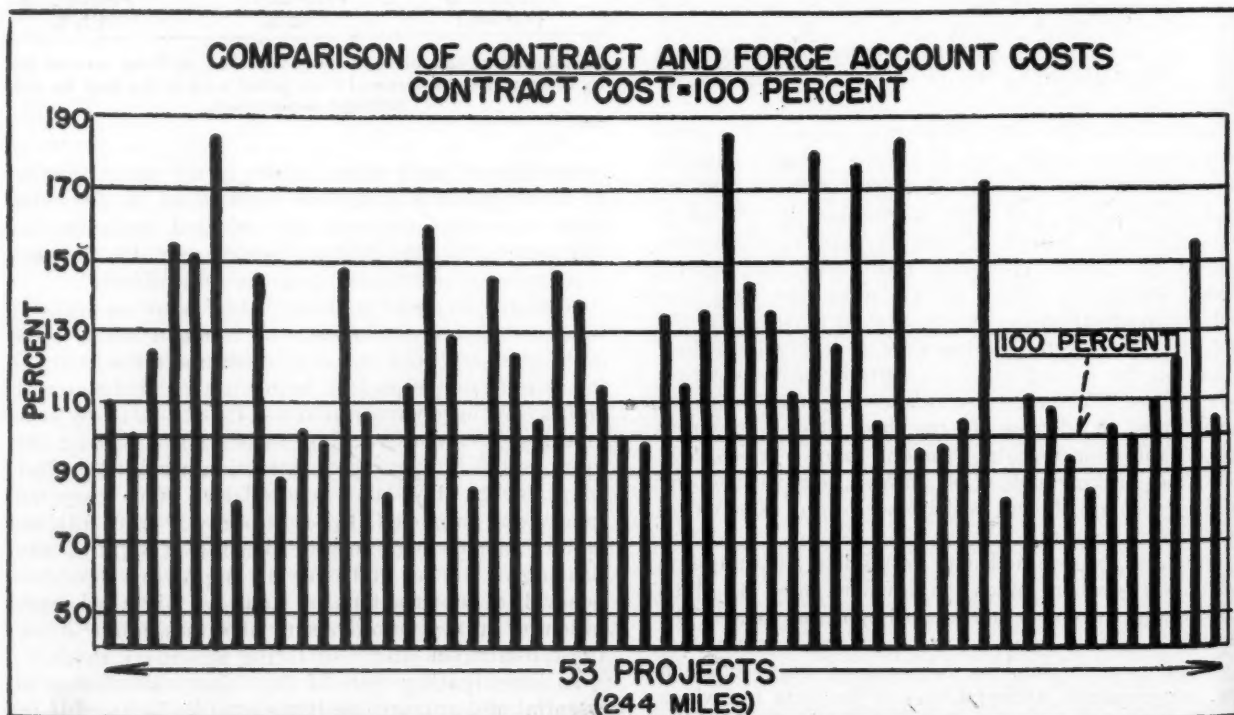
An important procedure in the administration of public works by contract is the prequalification of contractors. This has been rather widely adopted in one form or another although its greatest peace-time use appears to have been in connection with State highway construction. Nearly all the states, except those in the northeast corner of the country, have laws or regulations dealing with the subject.

During the war emergency, prequalification has been a necessary proceeding in connection with awards of Federal cost-plus-a-fixed-fee and negotiated lump sum contracts and in selection of invitation bidders.

Among the advantages commonly attributed to prequalification are the following:

1. It provides adequate time for determination of the contractor's qualifications before bids are received, thus obviating the necessity for hasty, and

(Continued on page 46)



Result of tests conducted in 46 states by highway departments. Force account projects which exceeded the contract cost are shown by bars which extend above the line; those which cost less by bars below the line.



Close-up view of Rolla's completed digester. The house on top covers the motor and gears.

## How Rolla Provided Sewerage for Its Wartime Population

By J. F. KILPATRICK  
City Engineer, Rolla, Missouri

**When 26,000 workmen at Fort Leonard Wood were added to the 5,000 population, a major problem was presented, complicated by priority restrictions. Plant operated for eight months while only partially completed.**

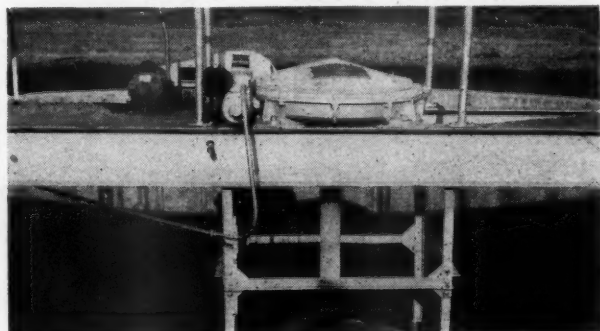
IN December, 1940, the Federal Government located Fort Leonard Wood at Rolla, Missouri. At that time the population of the city was 5,141. Our sewage plant had been designed for 5,000 people at 100 gpd per capita but not all of them were connected to the sewer system and the plant, of the Imhoff-trickling filter type, was serving us very satisfactorily.

But with the influx of 26,000 workmen locating in this vicinity to help build the fort, a very serious condition was occasioned immediately, with 1,200,000 gpd of sewage coming to our 500,000 gpd plant. And to make the matter worse, the increase in population occurred in the cold months of January, February and March, 1941. The tank's retention capacity was entirely insufficient to permit proper digestion, and we began to have trouble with constant foaming and running over; the pH dropped to around 5.0-5.2 and we were unable to bring it back to anywhere near normal even though we used lime constantly.

As soon as possible we retained Russell and Axon as consulting engineers to prepare preliminary plans and estimates for extension of the sewerage system and a new sewage treatment plant. As soon as these had been completed we applied to the PWA for help in building them. Our application was approved and the city was granted \$206,753 for laying the new sewer lines and replacing others whose size was insufficient

for the greatly increased sewage flow. Also the city was allotted \$127,227 for the construction of a new sewage treatment plant.

Soon thereafter a contract was awarded to Martin & Reilly Construction Co. of University City, Mo., to build the sewer lines, the final cost of which was \$193,000. Then a contract was awarded to Don P. Pray of Monett, Mo., to build the disposal plant. Both contracts carried a priority rating of A2, but there was considerable of the equipment and materials needed that this rating was not sufficient to purchase. This one thing caused us more trouble than anything else, and

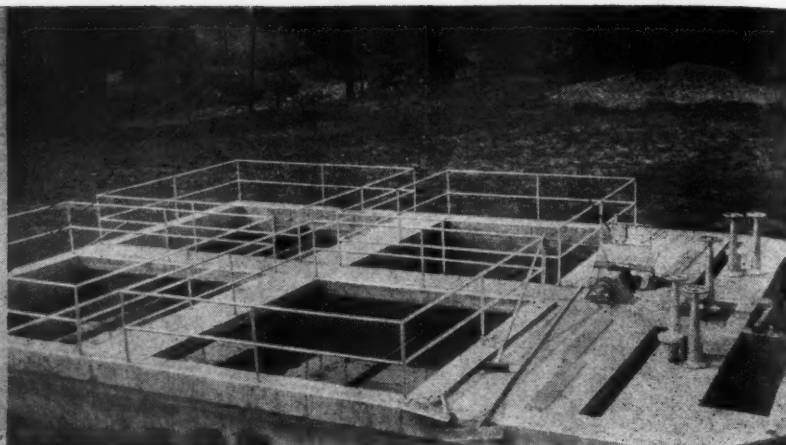


A view of the final tank.





J. F. Kilpatrick



Side view of primary tanks.

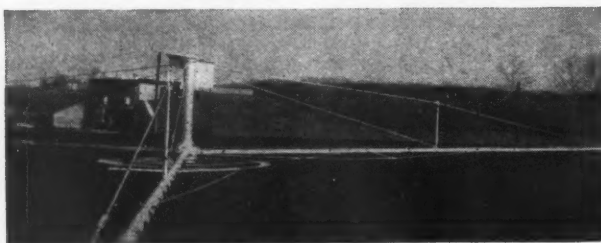
would have caused more if Mr. Pray had not had the foresight to make as many purchases as possible as soon as the contract was let.

The plant was designed as a trickling filter-separate sludge digestion type to serve a population of 5,000. The actual water consumption was 45 gpd per capita or 225,000 gpd total; but since the laterals and out-fall sewers were laid in a valley whose soil permitted a high infiltration rate, and the entire territory had a high water table, the engineers provided for flow at the rate of 720,000 gpd or 1.11 cfs.

Because of the high infiltration they also believed that a grit chamber should be provided, and this was designed for a velocity of 1 ft. per sec. at the design rate. Just below this is a Parshall flume for measuring the flow and it was believed that this would help hold down the velocity in the grit chamber even if the flow should reach a temporary peak of 2.22 cfs. The grit chamber is provided with an overflow so that any flow in excess of 2.22 cfs will be bypassed.

The primary tanks were designed on the basis of 3 hours' retention for the design flow of 1.11 cfs. Should the flow reach the 2.22 cfs that the grit chamber will pass, the retention time would still be  $1\frac{1}{2}$  hours, giving considerably more total purification than would be provided should everything in excess of the design flow be bypassed direct to the stream. The primary tanks are in two units, each 16 ft. by  $37\frac{1}{2}$  ft. by 10 ft. side water depth, the sludge being removed by Link-Belt "Straight Line" equipment. In the effluent flume of these tanks we placed an overflow weir which bypasses all flow above 1.11 cfs after primary treatment. The meter for measuring the sewage is a "Flo-watch" furnished by Builders-Providence.

The trickling filter, with its dosing chamber, was designed for the flow of 600,000 gpd at the rate of 2,000,000 gpd per acre, being 130 ft. in diameter with 6 ft. effective depth of stone. The medium used was a graded limestone that met the 20-cycle sodium sulphite test required by the State Board of Health. The mechanism was furnished by the American Well Works.



Trickling filter. Digester in the background.

The final tank is 25 ft. in diameter and has an 8 ft. 6 in. side water depth, with a capacity of 30,000 gal., providing one hour retention. The mechanism was furnished by the Dorr Co.

The digester is 30 ft. in diameter and has an 18 ft. side water depth and has a capacity of 12,500 cu. ft., or  $2\frac{1}{2}$  cu. ft. per capita. The mechanism was furnished by the Yeomans Brothers Co. After the contractor had the plant completed with the exception of the mechanism for the digester and the gas collection system, for which he was unable to secure a high enough priority, his contract (which was with the FWA) was closed and the plant was turned over to us by the Federal Government to operate. We accepted it with reservations because we were doubtful as to the efficiency which we could get if we tried to operate it without any gas collection system to furnish heat or any mechanism for the digester tank.

We operated it in this incomplete condition for about 8 months with fair results, and were finally, in September, 1943, given a priority rating high enough to secure the mechanism from Yeomans Brothers Co. for completing the digester and the gas collection system. Before again putting the plant in operation we seeded the digester with a slug from our old plant, but it did not build up enough gas to heat the control house or the hot water coils in the digestion tank last winter. However, the operation was good and we hope by this winter to have sufficient gas for heating, when the plant should operate more satisfactorily.

The construction of the disposal plant and the inspection of the sewers was under the supervision of Fred Hawthorne, resident engineer for FWA.

### Minnesota Cut Its Road Program

Road and street construction in Minnesota in 1943 was cut to one-fourth of the 1941 prewar volume. Maintenance expenditures also were reduced by the state but were increased by the subordinate units. Total expenditures of the state were reduced from \$27,479,690 in 1941 to \$15,286,056 in 1943; for county roads from \$15,950,874 to \$11,056,836; township roads from \$5,313,990 to \$4,687,021; and municipal streets from \$9,400,705 to \$8,138,164. Construction expenditures alone, however, were decreased from \$16,166,521 to \$4,296,819 by the state; from \$6,421,647 to \$1,123,259 by the counties; from \$2,029,538 to \$894,182 by townships; and from \$3,017,354 to \$821,068 by municipalities. These figures include construction, maintenance, debt service, administrative, engineering, equipment and miscellaneous items.



# Handling Car Body Scrap

City has collected and shipped over 1,700 automobile bodies as scrap. How it got over 100 bodies to the car load.

By R. C. BOLLIER

Superintendent of Water and City Supervisor, Alamosa, Colo.



R. C. Bollier

WHEN Pearl Harbor was hit, my only son had been two months in the U. S. Navy. So you can imagine I felt it was my war; and when the collection, preparing and marketing of salvage scrap fell to my lot I went to work with a vengeance.

The handling of scrap is a pretty big chore to a guy who knows nothing about it, and I was that guy. To date we have shipped to the mill 21 carloads of scrap iron and 17 carloads of automobile bodies, with over 100 bodies to the car—quite a lot to be dovetailed in with your other work. Perhaps a lot of you will think I am crazy, that you cannot get a hundred bodies on a car. But this is the secret: we run a tractor over a pile of about 400 bodies, and in one day reduce them

to a pretty small pile. Until we provided the ingenuity for getting them to the steel mills, the junk dealers would not handle them. Now the idea is in constant practice by everybody who is interested in selling scrap.

In handling car body scrap the first problem was collection. This was done with an old broken-down Ford and a Chevrolet dump truck, much of the money for purchasing which was furnished by the Mayor (since repaid to him). Much of the scrap was pulled out of the dump or the river or wherever it could be found. In preparing the bodies for shipment we used a 35 Caterpillar tractor, which was run over them back

(Continued on page 58)



Car being loaded with 47,400 pounds of scrap.

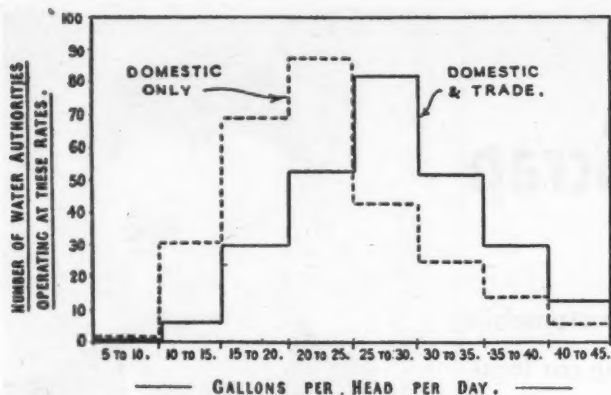


Fig. 5. One method of representing water consumption rates. A frequency distribution chart.

ONE of the simplest forms of graphs and the one most well known is that in which data represented by an equation are plotted in the form of a curve to normal scales horizontally and vertically. Although university courses do not usually include descriptions or methods of plotting the slightly more complex but much more useful graphs required by engineers, schoolboys and students are taught how to plot the parabola, the circle and the hyperbola and other simple regular and irregular forms.

One of the very simple graphs is the time graph, in which changes of value of certain data are plotted against time. Fig. 1, represents fairly and in a manner easily understood, the output of head of cattle of an area of land over a period of years. From this graph it can be seen that in the year 1927 the output was twice that of the year 1938, but that there had not been a steady decline. A sharp fall was followed by a slight recovery, followed by a comparatively steady period until another sharp fall brought the output down to one-half of the original figure. This graph, as shown in Fig. 1, could not be misleading, even to the most inexperienced in the use of figures. But Fig. 2 shows how, by omitting the earlier years (on the excuse that it would be unnecessary to go back so far) and the last year (on the excuse that information had not yet come to hand), the slope of the curve may be reversed. Then by plotting the curve to an exaggerated vertical scale and *not showing the origin* but raising the base line, an illusion is produced that suggests that there has been increase of output instead of a decrease. This form of deception, which has been used successfully, is not always easy to detect. It may, however, be said that a time curve, or any curve on which the origin can be shown, is suspect if the origin is omitted, and wherever such curves are concerned those who are interested should make certain that the whole of the data available have been used in their preparation.

Omission and incorrect representation of data are often the results of either careless preparation of material or bias due to preconceptions. Sometimes the person preparing the material may be so influenced by his convictions that he distorts his graphs to suit his theory; and it is surprising how seldom readers make proper examination of articles and papers in which they are interested. On various occasions engineers have published calculations containing mathematical and logical errors and have plotted curves which do not represent the data from which they are supposed to be plotted; but such errors are rarely challenged, for it appears that the average reader has neither the time nor the inclination to check the accuracy of arith-

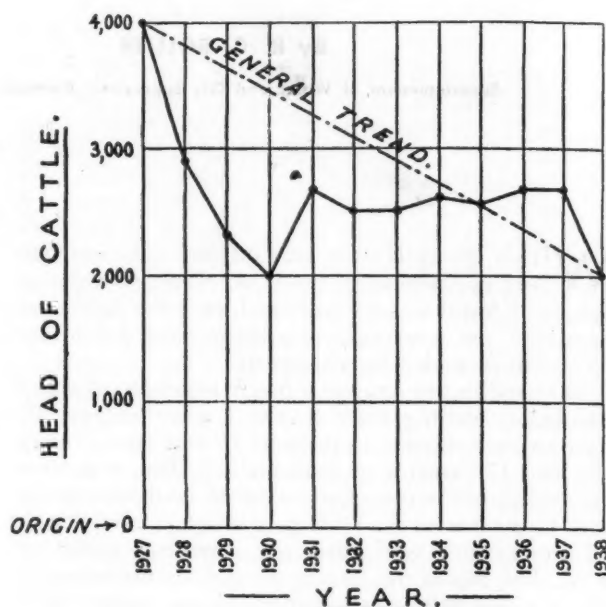


Fig. 1—Change of value plotted against time.

metic; he assumes it is correct, and therefore he is often misled. What is more deplorable is that very frequently results are given without the data from which they are obtained, making it impossible for serious research workers to decide whether or not work they are examining is of real value, and this may sometimes mean that laborious research may have to be repeated. In a recent case, a repetition of research proved that previous work had been incorrectly executed and was of no value whatsoever.

### Logarithmic Graphs

While the simple graphs, in which co-ordinates are plotted to normal scales, are the most useful when demonstrating material to other than technical men, the engineer can for his own benefit use distorted scales; thereby solving problems. In the same manner charts may be prepared for general use in the drawing office. One form of distorted scale is the logarithmic scale which, if applied to a time graph, represents, in the form of a straight line, data of a kind that changes logarithmically.

Fig. 3 shows the population growth of a provincial town. The curve is plotted to normal scales and appears in no way extraordinary. To begin with, the rate of population increases and then, as the town becomes fully built up, the rate decreases rapidly. If the engineer were required to make an estimate of future population this graph would give him very little guidance.



# Incorrect Preparation of Graphs

How they can be used to bring out certain trends indicated by data.  
Misuse of data, intentional or unintentional, may be very misleading.  
Frequency distribution charts.

He would not know whether to take the broken line or the dot-and-dash line, or something between the two. The graph tells him only that the broken line and the dot-and-dash line are the limits of probability. Similarly, he would learn from it little about the past.

It is, however, known that under normal conditions in virgin countries where there is no economic restriction on population growth, populations double approximately every twenty-five years. This involves a logarithmic expression, and therefore if time is plotted to a normal scale and population to a logarithmic scale the population curve for a virgin country becomes a straight line. In Fig. 4 the curve for the aforementioned provincial town is so plotted, when it becomes no longer meaningless, but full of interest. With the aid of the new curve it can be seen at once that at one time the growth of the town was logarithmic, but the rate of increase of population was less than that of a virgin country. Then came a period of prosperity and a rapid increase that could only be explained by immigration, after which the full development of the area and its economic limitation reduced the rate of growth.

Replotting again to fresh distorted scales in such a manner as to bring the last part of the curve to a straight line would make estimates of probable future population comparatively easy.

## Hydraulic Calculations

Graphs in which both scales are plotted logarithmically are particularly useful for hydraulic calculations.

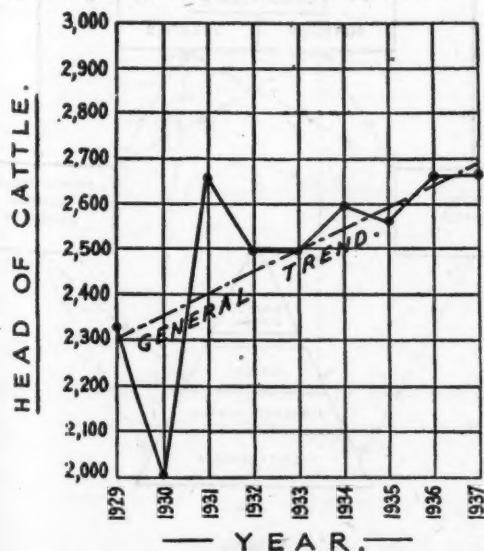


Fig. 2—How the same data can be used to show an entirely different trend.

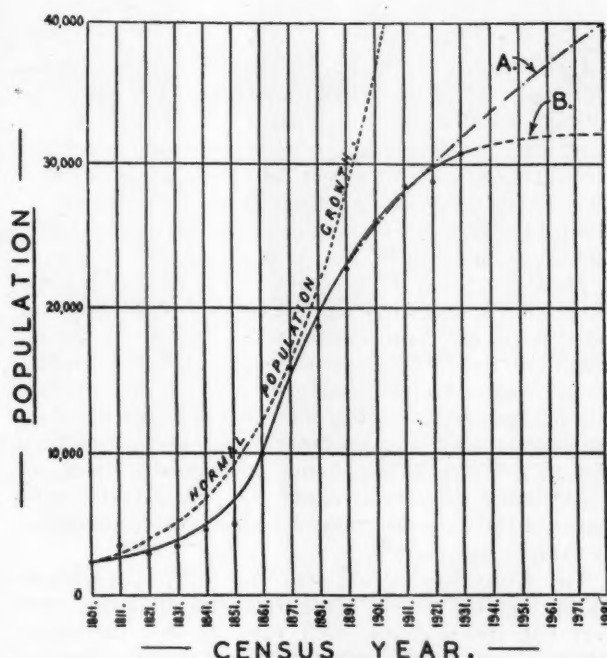


Fig. 3—Population growth shown by curve to normal scale.

tions, because they represent as straight lines equations of the type  $x = CY^n$ , and more complicated expressions of similar form. Moreover, such graphs may be superimposed one upon the other with advantage.

Using normal scales, the plotting of hydraulic data  
(Continued on page 34)

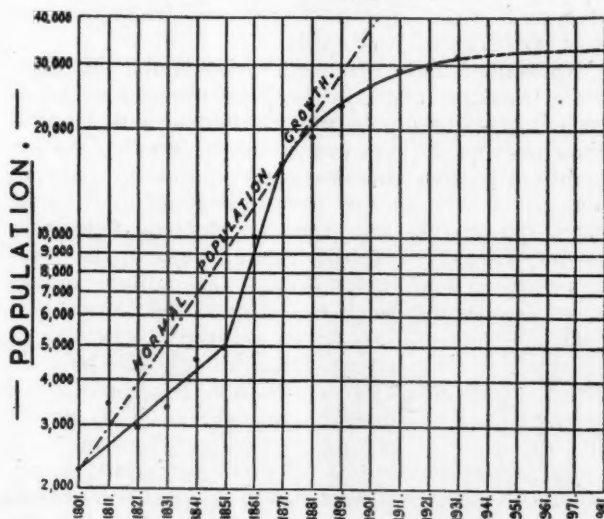


Fig. 4—Same data as in Fig. 3 with population on logarithmic scale.

# Bacteriological Control of Army Water Supplies in the Fourth Service Command

In this one area the Army has 646 installations, each with an individual water system, all under bacteriological control by regional laboratories. Organization and operation of the system of control.

By MAJOR V. BRUCE SUNDSTROM

Corps of Engineers, Chief, Utilities Section, Office, Deputy Service Command Engineer

WITH the advent of the present war emergency and the subsequent construction of numerous military installations throughout the country, certainly at no time in our history have so many water supplies been conceived, planned and constructed in so short a time. Particularly in the seven southeastern states comprising the Fourth Service Command did this construction program reach its greatest activity.

There are many factors, of course, which site-planning boards take into consideration in choosing the location of an Army installation, important among which are favorable climatic conditions, water supply, transportation facilities, maneuver areas, etc. Because this section of the country was able to fulfill these requirements most advantageously, the South has been host to millions of our young men from all parts of this country in without doubt the greatest and most intensive training program ever conceived or attempted by Americans.

The Army has in this area over 128 main stations which, together with satellite posts and sub-bases, total over 646 installations, each with its own individual water system. Approximately 30% of Army personnel is housed and trained in the Fourth Service Command.

So here we had hundreds of complete, individual water systems ranging in size from simple well supplies to the most modern types of filtration plants, serving small posts of a few hundred men to those installations of 100,000 or more. Planned, developed and constructed under conditions of haste, critical materials, and shortages of skilled labor, these plants presented initial operating problems demanding the most strict control and vigilance.

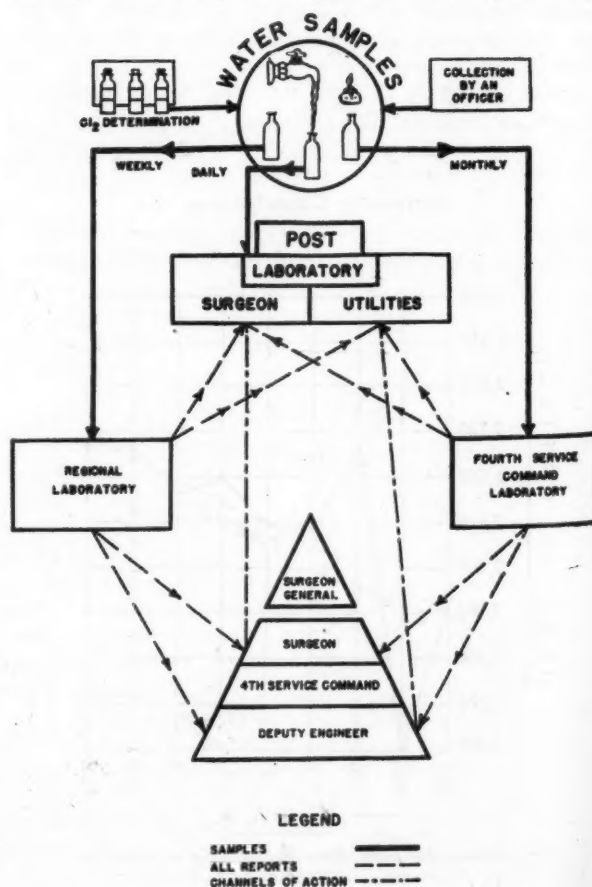
No wonder, then, that health officials and the water works industry at large viewed this tremendous development of water supply and distribution with concern. Some were quite frank in their statements that the job could not be done. Because plant equipment, distribution mains, services, and fixtures were all new, initial plant sterilization was a major problem. Operating personnel, newly recruited from all parts of the country, were in some cases making last minute adjustments even as the troops moved in on the posts.

Of the numerous facilities necessary at a post to provide for the housing and training of a modern Army, many initial deficiencies may be classed as inconveniences, the subject of the good old "G.I. gripe." But the water supply *has to be right*. In some local areas people build up a tolerance to certain mildly polluted waters with no apparent ill effects. However, the Army was confronted with the problem of furnishing water to both civilian and Army personnel from

all sections of the country with histories of widely varied water diets. And because of this and the high concentration of people in these areas, every precaution had to be provided to assure a safe, potable water supply.

Many established municipal water utilities are confronted from time to time by stubborn pollution problems when alterations and additions are made to existing systems. This, even with a staff of competent engineers, operators, technicians and the control service of state laboratories. Therefore, the potential hazards incident to the alterations and additions to the new Army water systems, made necessary by changes in criteria and expansion, presented a real challenge in bacteriological control.

The production and distribution of a safe, potable water supply at all fixed Army installations within the continental limits of the United States is the responsibility of the Corps of Engineers. The responsibility,





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originating with the Office, Chief of Engineers in Washington, is delegated through the Service Command Headquarters to the various post commanders and their staff officer, the Post Engineer.

The duties of a Post Engineer may be compared with that of a city engineer with a multitude of responsibilities. It is his staff of hundreds of civilian engineers, artisans and laborers who maintain and operate an Army post. All post utility services, housing, heating, fire protection and the multitude of duties which the Army calls "housekeeping," are his responsibility.

Except at small installations, the "post water department" is under the direct supervision of a civilian sanitary engineer. Policies and procedures of plant operation as established by higher echelon are strictly enforced.

Supervising the water facilities at all installations in the Fourth Service Command is the Water & Sewage Unit, Utilities Section, Office, Deputy Service Command Engineer. This unit is composed of a staff of highly trained sanitary engineers, both officers and civilians, recruited from the profession. These are the field service engineers who visit each installation on regular itineraries and whose services are available to the Post Engineer and his staff at all times for emergency calls. For the purpose of expediting this service, the Service Command is divided into five geographical zones, each with a zone office to which the field engineers are assigned. By this means very close control and correlation of plant operation of all stations is maintained throughout the Service Command. Thus, in addition to examining and correlating plant operation records, making recommendations for corrective measures, assisting in the design of alterations and additions to plant facilities, the field engineers act as a liaison between the field and headquarters on all matters pertaining to policies and plant operating procedures.

When posts were first activated, chlorination of water was not required for properly constructed Army developed water supplies or purchased supplies from established sources. It was found, however, that, because of constant extensions to plant and distribution systems and the pollution hazards associated with new construction, the percentage of nonpotable samples from Army supplies was far greater than those normally experienced in established municipal supplies. Although 30% of the water used at Army installations within the Fourth Service Command is purchased from municipal supplies, the point of purchase was generally at the extreme end of the distribution system or through long transmission lines. None of these conditions is conducive to maintaining a potable water system or an adequate residual when minimum chlorination is practiced.

It became evident, therefore, that for effective, positive control of Army water supplies against pollution from any source, whether by accident or design, it would be necessary to carry adequate chlorine residuals to meet war time conditions. This was accomplished by the installation of chlorinators on all supplies regardless of the source or whether, as in the case of purchased supplies, previous chlorination had been made.

The present policy for chlorination of Army water supplies is such that a chlorine residual of not less than 0.4 ppm after thirty minutes' contact period is maintained at all times in those parts of the potable water distribution system under constant circulation.

In order to maintain effective control of both chlorination and the bacteriological quality of all water sup-

plies, it was necessary that adequate facilities be made available and procedures established so that a system of water sampling and testing would be accomplished through central control. In the case of municipal supplies, this was being accomplished in most states by laboratories operated and controlled by municipal and state health departments. However, because of the magnitude of the Army operations, not only were these facilities unable to carry the additional laboratory load, but effective reporting and control of nonpotable samples could not be maintained.

To accomplish this responsibility, the Fourth Service Command has pioneered a system of bacteriological control of water through the establishment of regional laboratories which has proven most successful in safeguarding Army water supplies. In close cooperation with the sanitary officers of the Medical Corps, a highly organized system of water sampling, analysis and reporting now functions with an efficiency and dispatch at first not thought possible. Analyses are made of more than a thousand individual water samples collected daily from post water systems throughout the seven southeastern states, and every nonpotable sample is reported back to the post through the Service Command Headquarters by telephone or wire for confirmation and corrective action within a surprisingly short lapse of time. In the case of major trouble, special trailer laboratories, fully equipped to handle any emergency, and portable main sterilizing equipment are available to any area in the Service Command.

The organization and operation of this system of bacteriological control is logical, direct and effective. Regional laboratories are set up at thirteen Army posts chosen for their strategic location throughout the Service Command. The location of these laboratories was chosen so that no water sample would be in transit for more than twenty-four hours. A thorough study of transportation facilities was made; railroad time tables were checked and the Postal Department was contacted to ascertain the best service for sample shipment. In some cases, the regional laboratory nearest the reporting post proved to be less advantageous than a more distant laboratory due to train connections.

The regional laboratories are fully equipped to run complete coliform tests and any other bacteriological tests which may be required. All tests are conducted by Post Engineer technicians according to the Eighth Edition of "Standard Methods." Figure 1 is a flow diagram showing the method of water sampling at any individual Army post, the routing of samples for testing and channels of reporting. It will be noted that the Service Command Laboratory under the control and direction of the Service Command Surgeon acts as a control station to check the analyses and work of the regional laboratories.

No matter how small an installation, at least four samples are collected each week for analysis by a regional laboratory. Sixty per cent of the posts are sampled at least three times per week and the large posts submit samples daily. In addition, samples are often collected for analysis by the Post Hospital laboratory at the discretion of the Post Surgeon. Water samples are collected by a Sanitary Officer under the direction of the Post Surgeon, packed in special shipping containers and sent by the most direct route to the designated regional laboratory. Once a month, duplicate sets of samples are collected, one being sent to the regional laboratory and one to the Service Command control laboratory. Periodically, the control laboratory submits prepared samples to the regional laboratories



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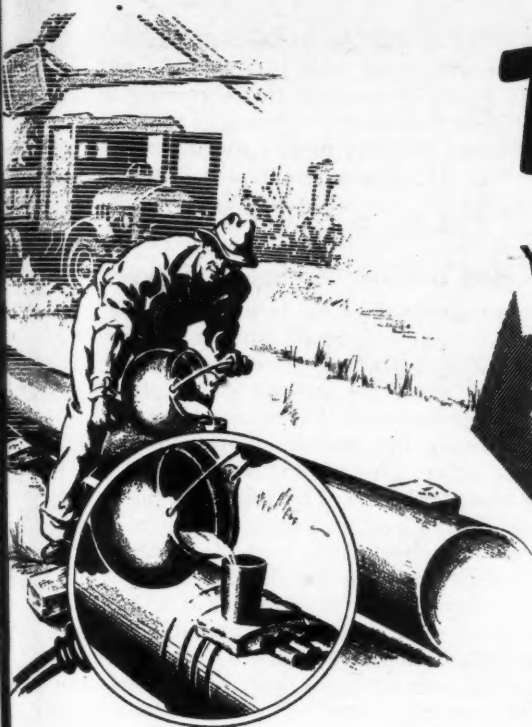
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for analysis as a routine check for accuracy of laboratory procedure.

Results of all bacteriological analyses are recorded on standard forms in quintuplicate. Copies are sent to the Post Engineers, the Post Surgeon, the Deputy Service Command Engineer and the Service Command Surgeon; the fifth copy is filed by the examining regional laboratory. These records thus comprise a complete and accurate history of the water quality at each post. They are a permanent record available for constant scrutiny both by the Medical and Operating services. This system has been largely responsible for an enviable record free of water-borne epidemics. Reports of nonpotable samples have steadily decreased to a point where, at the present time, less than 2% of all water samples are confirmed positive. Therefore, by honest recognition of the potential hazards, careful planning and control, and constant vigilance, our soldiers in training are furnished water far safer than the water they drank at home on the farm or in their local village or city.

The Fourth Service Command has constantly endeavored, through schools and training programs, to develop expert water plant operators and promote progressive ideas which will be a credit to the profession in post war operations. To this end, Army personnel has actively participated in national, state and sectional meetings of the profession.

The cooperation of these agencies, and the water works industry at large, has contributed in a large measure to the production and control of Army water supplies. It is with just pride, then, that we Americans can state that at no time in history have so many men been concentrated for any purpose with no incident of water-borne disease.

### Improvised Power Oiling Equipment

The Chief of the Sanitary Branch, Station Hospital, Camp Beale, California, reports the assembly, from materials at hand, of a device which will discharge a stream of oil as far as 25 feet. A one horsepower gasoline engine was connected by a drive shaft to a centrifugal pump from which a 1-inch rubber suction hose leads to a 50-gallon drum of oil. The discharge line of  $\frac{3}{4}$ -inch hose about 40 feet long is connected to the pump and into the end of this hose is inserted a  $\frac{1}{4}$ -inch metal pipe, 6 feet long, ending in a knapsack oiler nozzle. The entire assembly, including possibly several 50-gallon drums of oil, is placed on a truck which is driven slowly along the body of water to be oiled while one man directs over the water the stream of oil from the oiler nozzle. In case the truck cannot approach closely to the body of water, the man handling the discharge pipe walks along the edge of the water as the truck moves along. This accounts, for the rather long length of discharge hose and pipe.

The machinery for this improvisation was provided by the post engineer plumbing shop, the pump and motor having previously been assembled for other uses.—*Bulletin of the U. S. Army Medical Department.*

### Cranston's Rates for Sewer Rental

Cranston, Rhode Island, has recently adopted a schedule of rates for industrial sewer users which varies with the flow of suspended solids and the chlorine demand of the waste. The rates are \$22 per million gallons, \$5 per ton of sludge solids, and \$5 per 100 pounds of chlorine demand. In addition each

industry with 10 or less employees will pay a fee of \$25 and those with more than 10 employees will pay \$50 a year. Provision is made for measuring volume of flow and for determining the character of the wastes. The annual sewer rents for private dwellings, in effect for a year, are \$12 per single family, \$18 for two families, and \$4 for each additional family unit.

### Who Has a Cure for Leaky Sewers?

A city manager writes us from a Georgia city: "Would like to hear from some one on the best way to relay or build a sanitary sewer line through wet or boggy land where the ground water often leaks in or the sewage leaks out." Who can help him?

There are really two problems here: how to build a tight sewer in wet ground, and how to stop leakage in a sewer already in use. The former is possible by careful use of standard materials and methods. The latter has seldom been tried, we believe; but it certainly is possible (or is one of those "impossible" things that "may take a little longer") and the expense would in some cases, it is probable, be more than offset by elimination of backing of sewage into house plumbing, prevention of overloading of treatment plants, and other resulting benefits. One solution would be to line the sewer with concrete by the Tate process, used for lining water mains up to 12" diameter, or by the "Centriline" process for large pipes. In any case the section being lined would have to be free of sewage during the treatment; say by pumping it out of the manhole at the head of the section, through a hose or pipe laid temporarily on the surface to the manhole at the lower end of the section. For pipe 24" or more in diameter which is thus kept empty and has been cleaned, the joints can be calked from the inside by hand. The writer knows of one case where a long line of 24" and even some 20" pipe was so calked, using lead wool. Another suggestion is to thread into the sewer a steel or other thin-shell pipe, as large as can be got into the sewer, added in 4-ft. or 5-ft. sections as it is pushed in, and fill between it and the sewer with cement grout pumped into the annular space. The decreased diameter of the resulting tight sewer will be more than compensated for by the elimination of ground water.

For laying in wet ground, a reasonably solid foundation must be obtained; even if driving piles is necessary. If cast-iron pipe is used, with lead or similar joints, and a pile driven to support each joint, a permanent watertight line can be obtained. Or long lengths of Transit pipe can be used; or short lengths of vitrified or concrete pipe laid in cradles, supported by piles if necessary and jointed with a good bituminous jointing material. If the soil is very soft it may be necessary to anchor the pipe down in some way; we have known a pipe line to float to the surface overnight in a very wet soil.

### Garbage Incinerator for a Small Village

The village of Franklinville, N. Y., with a population of 2,100, in 1943 found itself confronted with the problem of sanitary disposal of its refuse. A dump which had been used for some time was responsible for a rapid increase in the rodent population, causing economic loss to the community, and contributed also to the pollution of Ischua Creek which is used as a source of water supply for a city twenty miles downstream.

In September the taxpayers voted \$10,000 for build-



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ing an incinerator for disposal of the garbage and rubbish, and priorities for the use of critical materials were obtained from WPB. The incinerator, which went into operation early in 1944, is unusually small, being only 8 x 23 ft. in plan, with a grate 6 ft. square. The plant, which has a capacity of one ton of refuse per hour, is in use only two days a week. It is operated under the supervision of employees of the village.

Since the plant has been in operation and the dump abandoned the number of rodents has decreased noticeably and the pollution of the creek from this source has been eliminated.

### Underground Refuse Collection in England

Removal of garbage and some other refuse direct from the kitchen by means of underground pipes is

being given a large-scale trial at a housing development in Leeds, England. The Garchey system which is being used was invented several years ago by a French engineer, and is particularly applicable to large apartment buildings or blocks of multiple dwellings. It involves a piping system connected to all kitchen sinks, which conveys the waste by gravity into a collection and settling chamber where the solid matter sinks to the bottom, while liquid matter overflows into the sewer system.

The settled solids and some water are then drawn by suction from the chamber through pipes to receiving tanks at the disposal station, where the excess water is removed by hydro-extractors and the residue is incinerated. A special device at the kitchen sink is required, including a trap, sealed at the top by a six-inch diameter solid metal cap and a plunger which closes the outlet and makes it water-tight.

The collection pipes at Leeds are located in an inside court and the collection chamber is located underground outside the buildings. It is estimated that the initial cost approximates \$125 to \$150 per dwelling. The Garchey system is not designed to handle tin cans, paper, and cardboard.

### Correct and Incorrect Preparation of Graphs

(Continued from page 27)

is laborious. For example, if one wishes to plot the discharge over a V-notch weir, it would be necessary, if normal scales were used, for a large number of examples to be worked out and accurately plotted and the curve then drawn with the aid of French curves. A formula for the discharge over a 90 deg. V-notch is:—

$$\text{Discharge} = C.h^{2.48}$$

To plot a curve using this formula would necessitate spending some time working out examples with the aid of tables of logarithms and then plotting and drawing the curve.

But if logarithmic scales are used, it is necessary only to take a piece of logarithmic paper or mark out the scales by measuring with dividers from a slide rule, and to work out and plot only two examples. For as the equation  $x = CY^n$  is a straight line on such a chart, the straight line that passes through the two calculated points gives accurate representation for all other examples.

Should it be desired to express formulae in which there are several variables, a little more time is required for plotting, but the work is again comparatively easy. For example, most of the recognized formulae for the velocity and discharge of flow in sewers, water and

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## Consumer Complaints?

When water consumers complain, it's time to use Aqua Nuchar Activated Carbon.

One of the many demands of taxpayers is that you deliver clear, pure and *palatable* drinking water. Yes, this is being accomplished by hundreds of cities and towns throughout the country by the use of Aqua Nuchar Activated Carbon.

Every waterworks official knows that all surface water supplies are subject to bad tastes and odors due to algae or pollution from industrial wastes and that the degree of pollution varies widely from day to day. Pollution from war industries has greatly increased and there is a strong tendency to increase more.

Wise waterworks operators use Aqua Nuchar Activated Carbon to remove all tastes and odors that cause consumer complaints.

### BLUEPRINT NOW!

But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.



## INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

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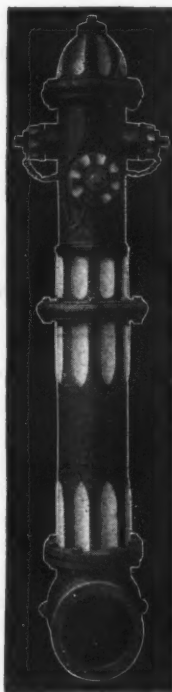
# WHO PAYS FOR YOUR BROKEN HYDRANTS?

Read what Minneapolis has to say about it in this clipping from the May 1944 issue of the "Journal of A. W. W. A."

The records also show the existence of 7,330 hydrants in the system. Each year about 70 to 80 hydrants are broken by traffic.

It is frequently difficult to collect for damage to hydrants by traffic. Usually such damage is the result of a collision or a maneuver to avoid collision and the "other fellow" is blamed. After arguments and legal efforts the burden of cost falls upon the water department, which is in no way responsible for the damage.

After all is said and done YOU pay for broken hydrants. And if you have 70 or 80 such accidents in a year, as Minneapolis does, your department will have to assume a heavy bill for hydrant upkeep. Why not eliminate the whole problem by switching to MUELLER-COLUMBIAN Fire Hydrants? The unique safety-flange and stem coupling prevent damage to the hydrant barrel, stem, and working parts. There is no flooding of the street and the hydrant can be made like new in half an hour by one man. This is but one feature of MUELLER-COLUMBIAN Fire Hydrants. Write for new folder giving complete descriptions.



BUY MORE  
WAR BONDS

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**CHATTANOOGA 1, TENN.**

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When writing, we will appreciate your mentioning PUBLIC WORKS

gas mains can be expressed by a four-axis chart of parallel straight lines logarithmically spaced. A chart of this kind can be prepared in less than an hour, yet once constructed it can save much time in the drawing office.

## Pictorial Diagrams

The comparison of quantities or changes of quantity by pictorial diagram is a legitimate and useful method. A common means of representation consists of columns of drawings of the articles the quantities of which are to be compared. The graph shown in Fig. 1 could be represented by columns of cattle, one column for each year, and a drawing of an animal for each thousand animals produced per annum.

Although the use of drawings is not necessary, and columns in color or columns represented by a straight line, as in Fig. 5, are just as expressive to an experienced reader of graphs, pictorial diagrams appeal to the eye, and for this reason they are preferred by propagandists and others who need to make their material attractive to the general public.

It is, however, possible to use deception in preparing pictorial representations. Suppose it is desired to reverse the deception shown in Fig. 2, and exaggerate the total decrease of output that occurred between the years 1927 and 1938. Diagrams could then be prepared in a manner much employed by the popular Press in which the length of the animal is in proportion to the quantity to be demonstrated. While this method cannot be accused of making an untrue statement, the effect is invariably misleading.

The eye tends to assess comparative quantity by comparing the areas exposed to it, and because areas in diagrams vary as the square of the difference of the lineal scale, the effect of using a pictorial method in this manner is to exaggerate differences.

If, on the other hand, it is desired to make a difference of quantity appear less than it really is, the simplest method to use is to make direct comparison of bulk. A pint pot is only 26 per cent higher and wider than a half-pint pot, and if a drawing of a half-pint pot were compared with a pint pot, the eye would not detect any great difference. Moreover, anyone who had been used to seeing comparative drawings of the type previously described would assume that the height of the pot was in proportion to the quantity and that therefore one pot contained only 26 per cent more than the other.

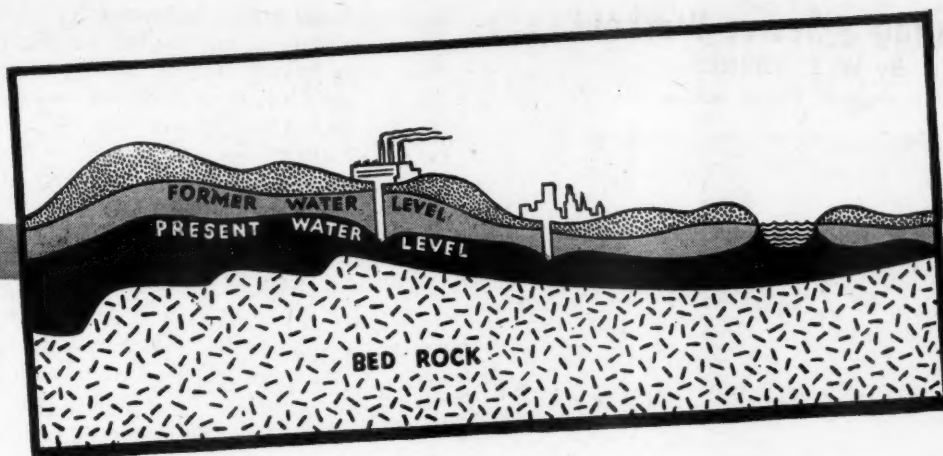
## Frequency Distribution Charts

A useful graph which, for some purposes, gives a more true representation than a numerical average, is a frequency distribution graph. This device, well known to statisticians, deserves more use by engineers. Fig. 5 gives one example of its application.

Engineers who have to make preliminary estimates of water supply for domestic purposes in areas where there are no records of consumption, frequently assume that the total domestic and trade demand will be between the limits of 25 and 30 gallons per head of population per day. If an average were taken by dividing the total consumption of water in Great Britain by the head of population a different figure would result. But what is of interest to the engineer is the frequency with which the rate of 25/30 gallons per head occurs compared with other rates of supply. Fig. 5 shows at once that the accepted estimate is fair and reasonable.

The above article is from the English weekly, "The Surveyor."





## AS THE WATER TABLE FALLS...

*Accurate Metering of all main flows  
becomes a "must"*

It is an alarming fact that more than half our public water systems are drawing from underground sources and through over-use and waste the water table is falling dangerously. Near the coast, wells begin to yield salt water; inland, the low water table may cut artesian well output in half. War industries are now drawing more heavily on underground reserves than ever before, but new process needs and air conditioning promise even greater drains in peacetime.

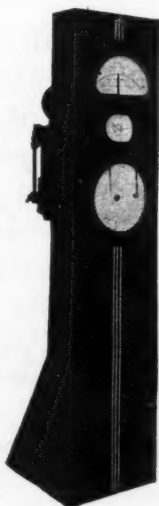
The available water supply must be conserved by reducing leakage and wastage to the minimum! Every main distribution line and every pump discharge line should have a Builders Venturi Meter, making avail-

able not only the total amount of water used day by day, but also continuous flow rate charts. These records reveal when and how much water is used and whether the system can be safely extended.

Builders Venturi Meters have been serving water systems for over fifty years. Into them are built the accuracy and endurance which have long made them the accepted standard of water works engineers and superintendents. Send for Bulletins 293C and 324A. Builders-Providence, Inc. (Division of Builders Iron Foundry), 9 Coddling St., Providence 1, R. I.

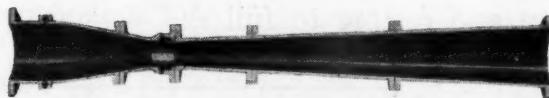
Sincerely Yours,

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**BUILDERS**  
WATER AND SEWAGE WORKS  
*Equipment*

"BLUE PRINT  
NOW"



Type M instrument totalizes, indicates and records flow through Venturi Tube.

Venturi Tube produces pressure differential to control the instrument.

*Sincerely Yours.*  
**BUILDERS-PROVIDENCE**

## Repairing a Sewer Washout

By W. E. BARNES

City Engineer, Liberty, Missouri

ON April 22nd Liberty, Missouri, had a three-inch rain in approximately thirty minutes. This deluge was more than storm sewers could carry. Basements filled up, and those which were connected to sanitary sewers overloaded them as well.

Several days after this downpour, when the streams had receded, word came to the office that a landslide had broken an eighteen-inch sanitary sewer. Apparently there is a stratum of soap-stone eight or ten feet below the sewer line, and when the high water in the ravine receded it let a volume of dirt slip, taking the pipe line with it. Upon investigation we found that approximately twenty-four feet of the sewer line, carrying about three hundred fifty thousand gallons of sewage per day, had been completely wrecked. All this sewage was flowing into a branch some fifty feet away and was being carried through small tracts of land having nice residences on them in the suburbs of Liberty.

Our first thought was to re-lay the line on a new alignment, which would require approximately one hundred feet of new sewer line. However, upon attempting to take up the old line, which had Portland Cement joints, we found that every joint would break. Therefore we concluded that the quickest and best solution would be to bridge across the slide. We were able to obtain some steel angle irons from a local contractor, and we bolted these together the proper space

apart to make a steel support to carry the line across the slide. In re-laying the tile we began at the lower end, using oakum and Portland Cement joints up to the last piece of pipe, where we had to contend with the flow of sewage. By breaking off a part of the bell on the last joint and laying this tile in line and turning it half way around we were able to caulk it with oakum tight enough to stop the flow through the joints until we could pour these last two joints with a pipe compound which sets immediately, thereby confining sewage flow back to the sewer line.

Because of the shortage of labor, and the seriousness of the emergency, we had to take the Street Department crew. It was an expensive mishap.

*Note by the Editor.* The method of inserting the last pipe, described by the author, is an excellent one. It can be used for inserting a Y in a sewer for a house connection (using a Y having the same length as the special). For this purpose, break out the original pipe, and carefully break off the top half of the bell that faces the opening. Also break off that half of the bell of the Y which will be on top when the Y is in its permanent position. Then insert the Y upside down and revolve it into position, which will bring both the half bells at the bottom. The bottom halves of the two joints can then be made as ordinarily, and the top halves made by covering them with a pad of bituminous or cement jointing material. If the sewer is in use, it can be dammed temporarily at the upper end of the break with a collapsible air bag or other means, which can be removed through the Y after the joints have been made.

## Restore Your Sewers To FULL Capacity

If yours is one of the many cities that are limping along on less than full-capacity sewers, it's "time to see STEWART."

For the easiest and most efficient way to take care of the sewer load is to make the most of what you already have. Instead of wishing you had new sewers, why not clean out and restore to full

capacity the ones you have?

Not only is there special, proven STEWART equipment for each different kind of job, but back of it is a wealth of know-how that can serve you well.—Know-how based on 43 years of experience "since 1901" in designing, manufacturing, and using the right type of tools for each specific task.



### HAVE YOU "WPA" SEWERS

If so, many of them are now old enough to need their first cleaning. Why not get off on the right foot by first consulting STEWART for full data and helpful suggestions?

### ← GET THIS BOOK TODAY

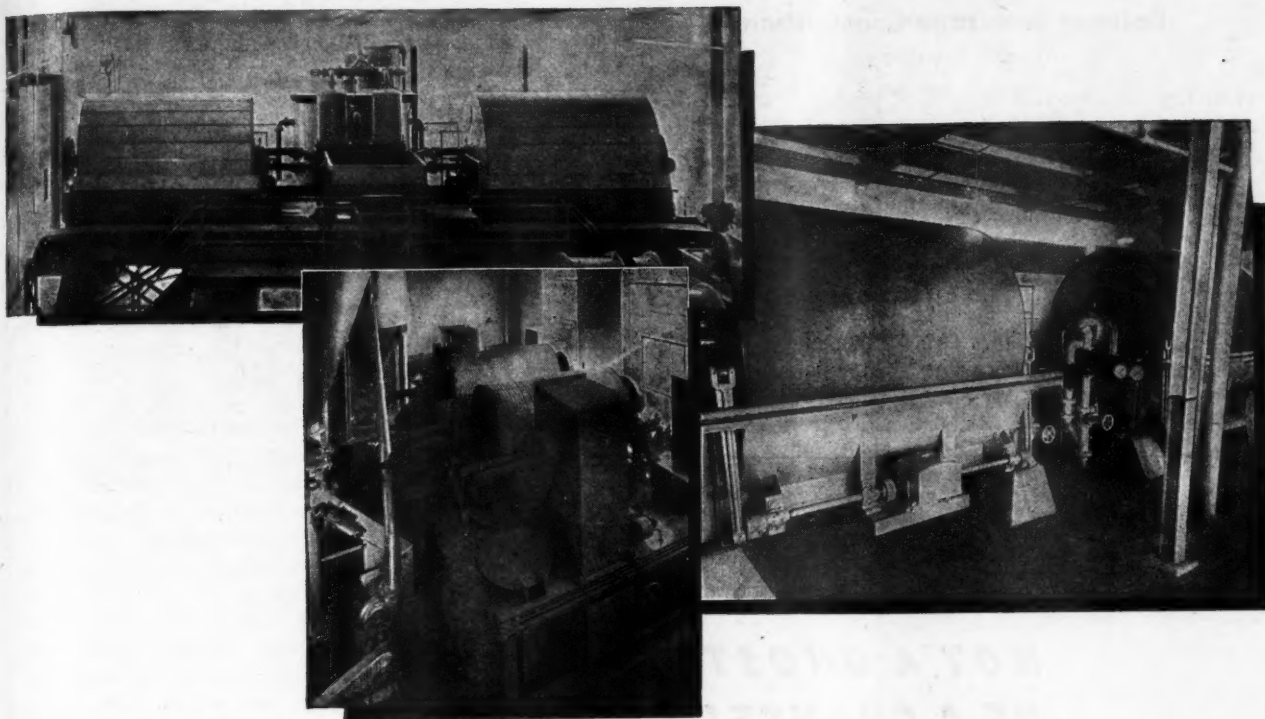
Whatever the job to be done, there is a STEWART rod, tool, or piece of equipment for its best doing. The first step is to get the complete new STEWART catalog today.

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# CONKEY SLUDGE FILTERS

Conkey Sludge Filters are efficiently dewatering sludges such as primary, elutriated digested, bio-chemical and certain industrial wastes in large and small communities.

The adaptability of Conkey filters to different sludges and wastes, and their flexibility of operation, has made them standard equipment for sludge dewatering operations in outstanding waste disposal plants throughout the country.

Conkey engineers can be helpful—now—in assisting municipal and consulting engineers prepare plans for badly needed sewage and waste disposal plants.



General American Process Equipment is a consolidation of four outstanding process equipment manufacturers, each a well-known specialist in its field, now welded together to serve you with one organization, one responsibility and one high standard of performance.

This Division is also closely associated with the Plate and Welding Division of General American Transportation Corp. at Sharon, Pa., where Conkey Sludge filters are fabricated.

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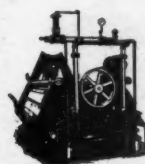
FRACTIONATING COLUMNS,  
PRESSURE VESSELS



TURBO-MIXERS,  
AGITATORS, AERATORS



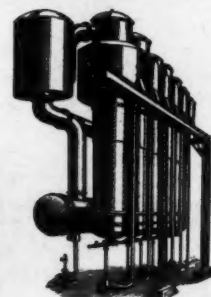
CONKEY VACUUM AND  
PRESSURE FILTERS



AMERICAN DRUM DRYERS  
AND FLAKERS



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CONKEY VACUUM  
EVAPORATORS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 79-81

## Postwar Sewerage Construction

(Continued from page 14)

structing additional sludge beds, primary tanks and a digestion tank. A third expects to build a \$300,000 plant as a postwar project. The capacities of the two existing plants are adequate.

In North Carolina, seven municipalities expect to build new plants, five of which are estimated to cost a total of \$985,500. Four of these have existing plants whose capacities should be increased an average of 35%.

Three South Carolina cities expect to build new plants; one to abandon its present plant and build an outfall sewer.

One Virginia city expects to construct drying beds

costing \$20,000. Five expect to build new plants, three of them estimated to cost \$1,250,000.

One West Virginia city is preparing plans for a new plant.

### East North Central States

In Illinois, five municipalities report plans for improvements and two for new plants. Of eight reporting on capacities, three consider them ample for 1950 conditions, four require 25% to 50% increase, and one 150%.

Three Indiana plants report improvements costing \$2,015,000. Four expect to build new plants. The improvements include digestion tanks and gas engines, sludge concentration tanks and drying beds. Most capacities reported are fairly satisfactory, but one plant of 100,000 gpd capacity should have 1,250,000.

In Michigan, 12 contemplated additions to plants are reported, 10 of which are estimated to cost \$1,564,800. Ten municipalities expect to build new plants, nine of them estimated to cost \$2,070,000. Additions include primary tanks, digestion tanks, sludge storage tank, grit chambers, chlorination chamber, vacuum filters, bar screen, comminutor, grease removal. Eight plants report capacities totaling 44,250,000 gpd at present, 68,000,000 gpd needed in 1950; none that does not need to be increased.

Of twenty-six Ohio municipalities reporting expectation of postwar work, 16 expect to build additions to their plants and 10 to build new plants. Eleven of the additions are estimated to cost \$6,646,000. Five of the new plants have a total estimated cost of \$12,590,000.

Eleven Wisconsin municipalities expect to make additions to their plants; eight of them estimated to cost a combined total of \$547,000. One city expects to build a new plant at an estimated cost of \$140,000. Among the additions listed are grit chambers, activated sludge aerators, digesters, sludge storage tanks, sludge beds, pumps, bar screens, garbage grinders, sedimentation tanks. Of eleven Wisconsin cities reporting on capacity, three need no increase, the other eight should be increased an average of 70% to meet the estimated 1950 requirements.

### East South Central States

In Kentucky, one municipality plans a new plant at a cost of \$75,000 or more. Another expects to increase its plant capacity by adding a digester, secondary settling tank and two sludge beds at a cost of \$150,000.

One Mississippi municipality will construct a plant "as soon as forced to by the state sanitary department."

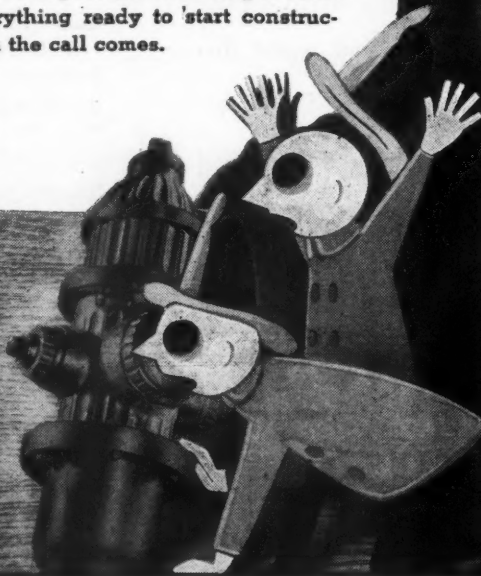
### West North Central States

Eight Iowa cities expect to make additions to their present plants,

(Continued on page 44)

## NOT A GHOST OF A CHANCE!

Without careful planning now, we won't stand a ghost of a chance of avoiding another great unemployment crisis when the war draws to a close. Public-works officials in particular will be expected to take up the slack of dissolving war-industries and mustered-out veterans. Right now, there are millions of dollars of badly needed water-works and sewerage projects waiting to get under way. It is the duty of every public official to his community, and to the nation-at-large, to **BLUEPRINT** these projects **NOW** . . . to prepare specifications . . . to plan the financing . . . and have everything ready to start construction when the call comes.



# MATHEWS HYDRANTS

400 CHESTNUT STREET, PHILADELPHIA, PA.

ESTABLISHED IN 1893

Made by R.D. WOOD Company

MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

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# ..they're getting efficient water transportation at low cost with TRANSITE PIPE

**T**HOUSANDS of Johns-Manville Transite Pipe installations are at work carrying water for cities, towns, and villages all over America—economically providing a high rate of flow that can never be choked off by tuberculation. Made of asbestos and cement, compressed under great pressure, J-M Transite Pipe has these advantages:

**Tuberculation No Problem.** Non-metallic in composition, Transite cannot tuberculate. Its initial high-flow coefficient (C-140) can never be reduced by tuberculation.

**Low Maintenance.** Transite's corrosion-resistance and maintained strength contribute to its low upkeep cost.

**Tight, Flexible Joints.** Wide sweeps can be made with straight lengths because the Simplex Coupling stays tight even when the line is deflected as much as 5° at each joint.

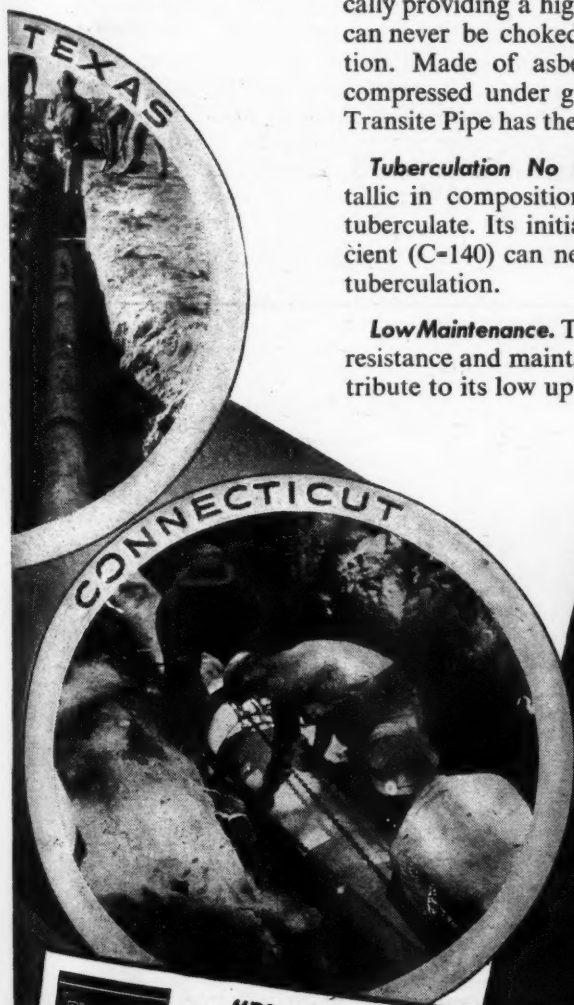
**Easy Handling.** Light-weight Transite Pipe requires fewer men for handling. Only the larger sizes need mechanical handling equipment.

**Rapid Assembly.** Even inexperienced crews form tight joints easily, quickly with the Simplex Coupling.

\* \* \*

For the facts, write to J-M for Transite Pipe Booklet TR-11A. For details on Transite Sewer Pipe for more efficient sewage disposal systems, get TR-21A. Johns-Manville, 22 E. 40 St., New York 16, N. Y.

**TRANSITE PIPE IS AGAIN AVAILABLE  
FOR PROMPT SHIPMENT**



**Johns-Manville**  
*Asbestos*  
**TRANSITE  
PIPE**

FOR EFFICIENT, ECONOMICAL  
WATER AND SEWER LINES

JOHNS-MANVILLE  
**JM**  
PRODUCTS

## "Blueprint Now!"

Create jobs for our returning soldiers! And benefit our cities, towns and villages. Plan now to improve and expand your water and sewerage systems. As an aid, the Committee on Water and Sewerage Development has a booklet entitled "Blueprint Now!"

If you do not have a copy, write the Committee at Suite 2110, 500 Fifth Ave., New York 18, N. Y.

When writing, we will appreciate your mentioning PUBLIC WORKS

these including gas collectors, settling tanks, digesters, drying beds, filter beds, grit chambers, pump house, etc. Two expect to build new plants at costs of \$350,000 and \$100,000 respectively. Of six cities reporting on the subject, three say the present capacities will be adequate for 1950; the other three need an average increase of 125%.

Five Kansas cities expect to spend \$386,000 on additions, which include two activated sludge plants, a digester and sludge beds. Five expect to build new plants. Eight cities report on capacities, only one of which appears to be seriously overloaded. (This one expects to enlarge the plant to four times its present capacity.) These eight plants have a present capacity of 13,230,000 gpd and estimate their 1950 needs at 18,670,000.

One Minnesota city expects to add another 800 gpm pump as a standby, another to spend \$25,000 on general repairs. Six cities expect to build new plants, four of them estimated to cost a total of \$963,000. Of four plants reporting capacities, one is ample, two will need a 35% increase and one a 200%.

Nine Missouri plants are to receive additions, five of them to cost a total of \$718,000. They will include secondary treatment, sludge beds, a rapid-rate filter, gas scrubber, sedimentation tanks, aerator tank, digester and laboratory. Two new plants are planned to cost \$84,239 and \$70,000 respectively. Of seven cities reporting capacities, two are sufficient for 1950. The other five need an average increase of 75%.

One Nebraska city expects to add larger primary and final tanks and pumps at a cost of \$75,000 to increase the capacity from 3 mgd to 4 mgd.

In North Dakota, one plant expects to add a digester

and gas collection system to the present Imhoff tank and filters, at a cost of \$100,000.

Three South Dakota cities expect to enlarge their plants, one by adding secondary clarification, one by installing blowers, aerators and sedimentation tanks at a cost of \$100,000, and one to triple present capacity. One needs capacity increase of 25%, another 200% and the third 1200%.

#### West South Central States

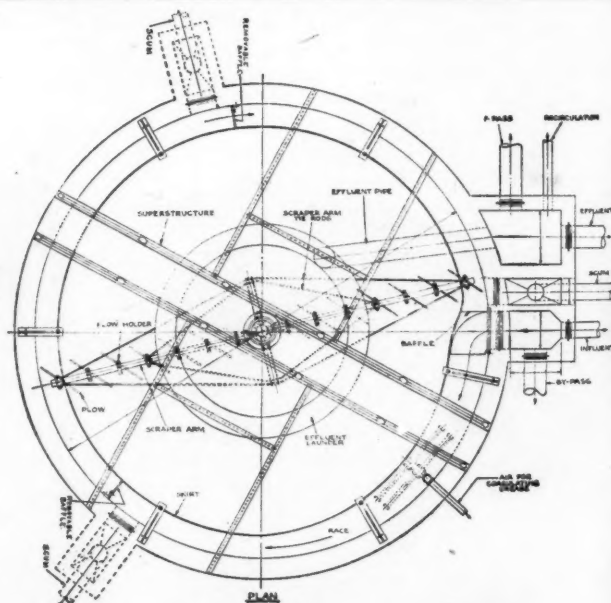
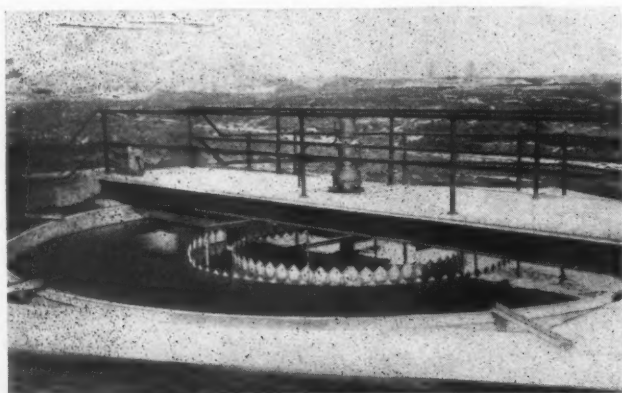
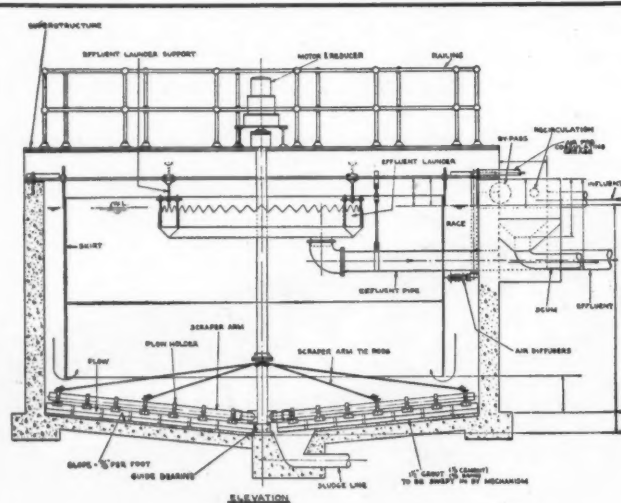
Three Arkansas cities expect to make minor additions estimated to cost about \$15,000.

One Louisiana city is completing plans for remodeling its plant at a cost of \$50,000, or possibly rebuilding at a cost of \$225,000. Another city expects to build a new plant costing \$350,000.

One Oklahoma city plans to rebuild its plant at a cost of \$3,500,000. Another to remodel at a cost of \$1,500,000 and build another plant costing \$1,250,000. Another has plans and specifications prepared for a 900,000 gpd plant and expects to build another later for 2,500,000 gpd. Two other cities expect to build new plants to cost \$200,000 and \$45,000 respectively.

In Texas, 23 cities expect to make additions to their plants, 18 of which are estimated to cost a total of \$1,778,500. These include grit chambers, settling tanks, aeration tanks, blowers, sludge beds, trickling filters, digesters, Imhoff tanks, pumps. Nine cities expect to build new plants, estimates for four of them totaling \$305,000. Of 23 cities reporting on present capacities and 1950 requirements, only one small one considered its present capacity sufficient. Two esti-

(Continued on page 58)



### Spiraflo Clarifiers Provide:

1. Excellent removal of scum, oil and grease.
2. Actual detentions are very good.
3. Removal of B.O.D. and suspended solids are above the average.

Write for bulletin 120

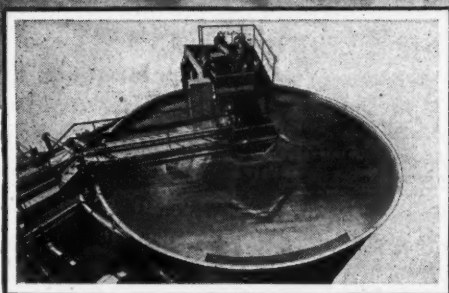
**LAKESIDE ENGINEERING CORP.**  
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**The skill that makes sea water  
drinkable for him...**



**.. can give your entire city a  
soft, sparkling water supply**



**PERMUTIT SPAULDING PRECIPITATOR** removes water hardness, dirt and color by the sludge blanket process. This new-design equipment cuts detention time, saves chemicals, takes only half the space of former methods. Present installations handle capacities up to 120,000,000 gallons daily.

**L**ATEST example of Permutit's service to our country at war is the kit which takes the salt out of sea water to keep alive our flyers forced down at sea. After the war Permutit's long experience in water treatment will help to build a happier, healthier America. For instance, recent developments by Permutit\* make it more practical and economical than ever for municipalities to enjoy good water supplies—free of hardness, dirt and iron.

Many cities have put good water at the top of their lists of post-war improvements. Plan it now for *your* community! Write for full details to The Permutit Company, Dept. G4, 330 West 42nd St., New York 18, N. Y. In Canada: Permutit Company of Canada, Ltd., Montreal.

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• WATER CONDITIONING HEADQUARTERS •



# RAPIDITY!

# UNIFORMITY!

# SATISFACTORY!

Contraction joints *MUST* or should be installed within the "opportune" limited time of ten minutes; this requires speed and proper machinery. All Engineers know how disastrous it is to work concrete too wet or too dry.

"FLEX - PLANE" mechanical joint installers for all types of joints—ribbon, premoulded, poured, cork, rubber, etc.

Ask for Bulletin E-11; it "portrays" other things you know!



**FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.**

• Ask for Equipment Specifications •

**FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U. S. A.**

When writing, we will appreciate your mentioning PUBLIC WORKS

## Highway Construction by Contract or Day Labor

(Continued from page 22)

- frequently incomplete investigation of the low bidder after bids are opened.
2. It eliminates pressure often brought to bear upon the awarding authority to accept the bid of an unsuitable contractor.
  3. It prevents the public criticism which sometimes arises when an awarding authority disqualifies the low bidder and makes the award to a higher one.
  4. It influences contractors to build up their qualifications to definite standards and thus creates a larger group of qualified competitors.
  5. It discourages the activities of shoestring operators, so called, who do not possess the responsibility or resources necessary to surmount unforeseen construction difficulties.

On the other side of the question the following arguments are sometimes advanced:

1. Prequalification opens the way to restriction of competition for political reasons or to favor local contractors.
2. It offers an opportunity for collusive bidding, especially if the qualified bidders are regularly in competition with each other.
3. It retards participation by new organizations which, through process of small beginnings and sound growth, would eventually qualify and replace organizations retiring from the field.
4. It becomes a factor in the establishment of trade barriers between the states, thus restricting interstate commerce and free competition.

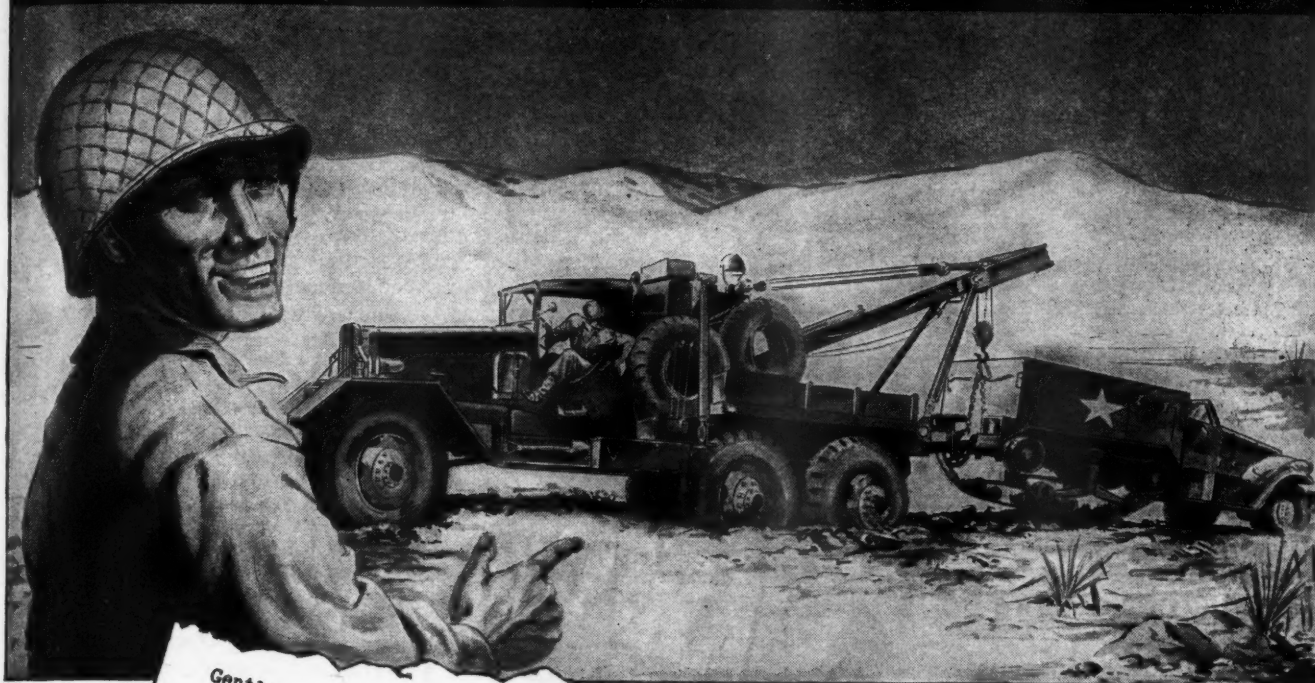
Experience covering the past fifteen years appears to have justified the arguments in favor of prequalification. There seems to be little doubt but that the idea is a practical and helpful one, capable of producing beneficial results. In those occasional situations where the procedure has proved relatively ineffective the reason usually may be traced to defects in the laws or regulations governing its operation. During the war contractors have accustomed themselves to Federal prequalification and there is cause to believe that the subject will obtain wider recognition when peace returns.

Standardization of forms and data requirements would perhaps do more than anything else to promote the use of prequalification.

### Contract Information

Information about prospective contractors is important to successful operation by the contract method. Since the first World War facilities have been provided whereby officials and financial interests can obtain needed information regarding the qualifications of contractors. In 1926 committees representing the principal technical, official and trade organizations interested in construction, recommended establishment of an independent agency which would investigate the business reputation and construction ability of contractors. As a result of this recommendation, in 1929 construction and surety interests cooperated in the establishment of the Bureau of Contract Information. It is an independent non-profit institution financed principally through subscriptions from nearly all important bonding companies. Its principal function is that of a clearing house which assembles and verifies data regarding the background and capacity of contractors. This information, in factual, unbiased form,

# THAT'S MY POSTWAR TRUCK



Gentlemen:

An American Army officer told me of the hard knocks and strains encountered daily by some of your heavy equipment, in hauling over trails impossible to negotiate with some of the regular Army models supplied by one of your well-known competitors, and aroused my curiosity to the point of writing for literature about Ward LaFrance non-military vehicles.

I would especially like illustrations or specifications concerning your heavy-duty gasoline and Diesel powered commercial models used in over-the-road transportation operations. Any information you may care to mail me would be gratefully appreciated and I can assure you it will pass into hands that may be vitally interested in Ward LaFrance as a possible solution in trucking problems.

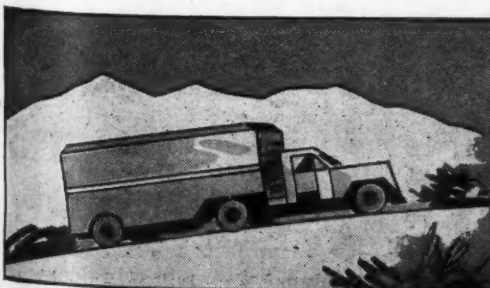
Very truly yours

~~Ward LaFrance~~  
Instructor, Operation  
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This letter is typical of numerous unsolicited commendations, received from men who know trucks and who have seen Ward LaFrance military models at work at the fighting fronts.

We have been authorized to resume the manufacture of a limited number of civilian trucks during 1944, but, of course, military demands for Ward LaFrance trucks come first. When Ward LaFrance civilian models do become available, they will offer

an unusual opportunity to standardize on trucks known the world over for extra stamina and dependability... on a unique plan which no fleet owner will want to overlook. For further details, write our Sales Department today.



## WARD LAFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC. • ELmira, NEW YORK



is available without cost to those charged with the responsibility for making contract awards.

Each State Highway Department usually maintains a file of information relating to the performance of contractors within the State and this information is available for exchange between the States.

The most widely used and most firmly established means of carrying on public construction is that of open competition on a lump sum or unit price basis and award made to the lowest responsible bidder.

Experience has shown that successful routine employment of the competitive contract method requires:

1. Full and clear plans and specifications available in advance.
2. Sufficient notice to prospective bidders.

3. Opening of sealed bids in public, surrounded by safeguards designed to prevent bid manipulation.
4. Prompt award at prices offered by the lowest qualified bidder.
5. Exaction of a binding third party indemnity against loss.

This last requirement, that of third party suretyship, is one of the most important factors in the success of modern contract construction for it brings in a separate outside resource, distinct from but bound with, the contractor.

In carrying out the program of Public Works highway construction authorized by the Act of June 16, 1933, it was required that each State undertake to construct one or more sections of highway with forces employed directly by the State. The purpose of the requirement was to determine the relative economy and efficiency of highway construction by contract and by direct employment of labor.

Forty-six States and one Territory constructed 53 sections of highway that were considered representative of the work generally done. The sections of highway were selected from advertised work after bids had been received and publicly opened and without advance determination.

Construction was executed under the same requirements as for contract work, adhering closely to the original plans. Labor was obtained through the local reemployment agencies when available. The regulations governing wages, hours of employment, and the use of equipment that were applicable to contract work were observed.

As the work progressed the State Highway Department kept detailed cost records of expenditures classified according to the items upon which bids were received and of general charges to be prorated among the various items. These data were submitted to the Bureau and are the basis of this portion of the report.

Each highway department was considered as a contractor. With two exceptions compensation and liability insurance premiums that would have been paid had the work been performed by contract, were included as a part of the construction cost and no payments of damages were included. In one State neither premiums or payments of claims are included. In another State actual payments of damages exceeded the estimated premium and the actual payments only were included. The cost of a bond for faithful performance was not included.

The 53 projects selected for the test totaled 244 miles in length

## Better Built MOTOR GRADERS

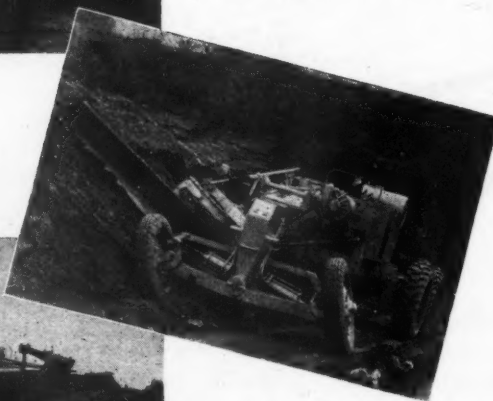
**Simple Design—Rugged  
Construction — Long  
Use—Hard Wear.**



Blade cuts to right and left, forward and reverse, with a full range of positions.



WARCO Hydraulic Graders come into their own where going is tough on new road.



Machines with easy, fast, precise action with minimum operator effort.

Limited distribution now on WPB releases or approval—but ready for post-war construction.

# W.A. RIDDELL CORPORATION

BUCYRUS - OHIO





## It eats the same grub as planes

**And likes it!** . . . Yes, a Homelite Portable Generator can be operated on high octane, highly leaded aviation gasoline. No special diet is necessary . . . even 100 octane gas, the fuel of planes, can't harm a Homelite's built-in gasoline engine.

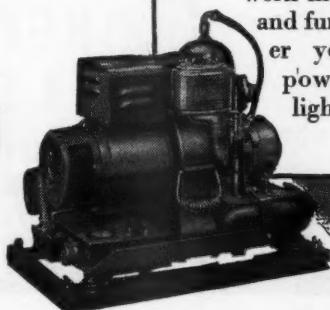
The simple reason is this . . . the Homelite *two-cycle* engine has no exhaust valves to burn out. That's right . . . no valves to foul with lead or carbon . . . no valve seats to reface. Its only valve is a simple rotary valve that governs the flow of fuel.

This, plus automatic voltage regulation, a lubrication system that supplies fresh, clean oil at each revolution, are some of the many reasons why thousands of rugged Homelite Portable Gasoline-engine-driven Generators are working in and around our military planes everywhere.



# HOMELITE CORPORATION

PORT CHESTER, NEW YORK



A Homelite Portable Generator isn't too fussy how you treat it or how you use it. Just give it some gasoline with a proper mixture of oil and it will work all day and night. It will work in rain, snow, sleet or heat and furnish all the electric power you need for operating powerful, flickerless floodlights or handy electric tools.

and were of various types of construction. Substantially all projects were graded and drained and were surfaced with concrete pavement, a granular type surface such as gravel or stone or with a standard type of bituminous construction.

The total cost of construction by the force account method was \$3,942,879, an increase of \$593,126 or 18 per cent over the total of bid prices of \$3,349,753.

On 40 of the jobs aggregating 176 miles or 75.5 per cent of the total projects the cost exceeded the bid price. The cost of these jobs by the force account method was \$2,944,773, an increase of \$703,384 or 31 per cent over the total of bid prices of \$2,241,389. Comments were received on the efficiency of management of 29 of the jobs in this group. They are summarized as follows:

- (1) Eighteen reported as inefficiently managed.
- (2) Two reported as inefficiently managed and subjected to outside interference.
- (3) Four reported efficiently managed.
- (4) Five on which the State claimed contractor's bid did not include ownership expense of equipment.

Thirteen jobs, totaling 68 miles in length or 24.5 per cent of the total were completed at a cost less than the bid price. The cost by force account was \$998,107, a decrease of \$110,257 or 10 per cent under the bid price of \$1,108,364. Six of these jobs were reported as efficiently managed, one was reported as inefficiently managed, and no comment was made for six of the jobs.

Figure 1 shows graphically the comparison of contract with day labor costs, based on contract cost being 100 per cent.

Since the State Highway Departments had not been constructing highways by day labor on a large scale it was conceded that the day labor costs would have been slightly lower if the States had had more experience and time for preparation.

Some of the States lacked equipment and personnel with which to handle the work.

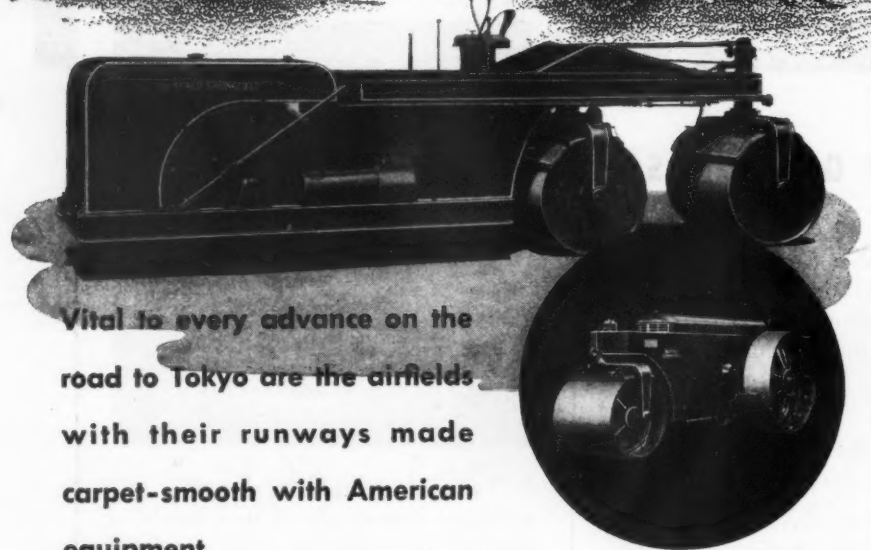
The regulations required competitive bids for supplying equipment on a rental basis and for supplying materials. A contractor probably would have used his own equipment and could have purchased materials as he chose. It is claimed by some that these requirements may have increased the day labor costs on certain projects.

As a result of the cooperative investigations it is believed that one of the principal advantages of the contract system over the day labor method has its inception in the self interest that is characteristic of human nature. Employed supervision, not having a monetary interest, does not have the same incentive as a contractor who enjoys the financial rewards and to whom losses are a personal penalty. He is spurred on by the knowledge that he must maintain efficiency or be forced out of business.

These tests of the day labor method, with few exceptions and those only where conditions were most favorable, show the advantage in economy and efficiency of construction under the personal supervision of a contractor who has suitable equipment.

#### Day Labor vs. Contract in County Road Work

In 1941 PUBLIC WORKS Magazine, New York, undertook to determine which was considered more advantageous for county work, construction by contract or by day labor. Of nearly 1,000 counties answering the



Vital to every advance on the road to Tokyo are the airfields with their runways made carpet-smooth with American equipment.

Prominent in the preparation of these runways are Buffalo Springfield rollers . . . the same rollers that will again serve in peacetime.

## BUFFALO SPRINGFIELD ROLLERS

THE BUFFALO SPRINGFIELD  
ROLLER COMPANY  
SPRINGFIELD, OHIO, U. S. A.

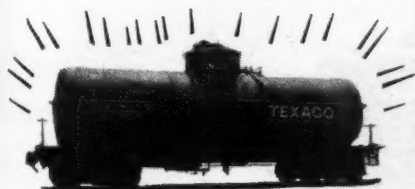


# HOT OIL...

...MAKES FAST  
WORK OF THAT  
OILING PROJECT



**GET HOT OIL—  
FAST—WITH LESS  
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WATER**



Not just a "boiler on wheels" but a rugged, compact, highly perfected steam generator built by specialists in steam generating equipment.

★  
The only tank-car heater with the fuel-saving four-pass flue travel construction. No water problem — full condensate recovery and return to heater under pressure.

★  
An all-purpose unit—provides steam wherever and whenever needed — for heating, thawing, cleaning.

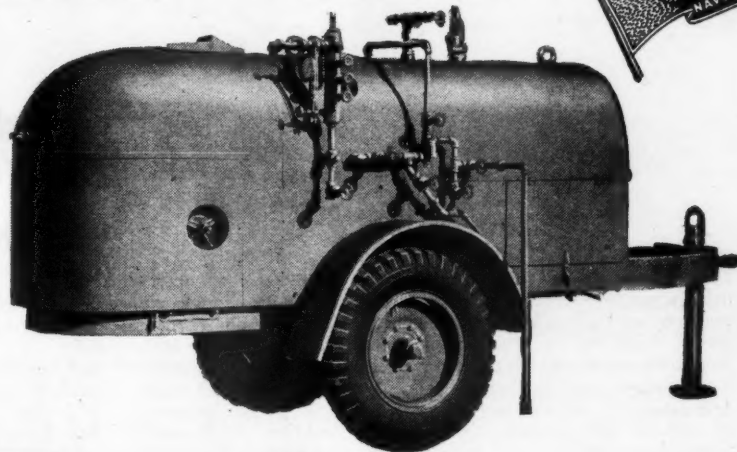
**T**HE tank-car on the siding is the starting point for fast work on any oiling project. The quicker you get the oil or asphalt up to application temperatures and flowing into the distributors — the faster your road crews can get going.

With a Cleaver-Brooks tank-car heater you have hot dry steam flowing to the car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks tank-car heater asks less in fuel and water. The famous and exclusive four-pass flue travel means low fuel consumption; the turbine type condensate return system cuts water loss — every drop of condensate goes back to the heater under pressure. . . . Built for full capacity — full-time work — Cleaver-Brooks tank-car heaters will give you the most in production hours on the job. Wherever in service, Cleaver-Brooks are usually given the tough jobs because of their known reliability. . . . Write today — get full information from Cleaver-Brooks — the pioneers and originators of tank-car heaters and bituminous boosters.

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ORIGINATORS OF

**TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS**

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questionnaire, 595 gave definite replies, 368 or 62 per cent found day labor more advantageous while 227 or 38 per cent reported that contract supervision was better.

In some States practically every county followed the same system while in others both methods were used. For instance, in Iowa, 41 counties reporting, contract construction was almost universally favored; but in Kansas, the 50 counties replying were in favor of day labor.

With regard to efficiency and quality of work 28 counties out of 47 reporting stated that a better job was done and the work was more efficient by contract while 19 favored day labor for the same reason.

Generally contractor equipment was favored for heavy excavation and for high type paving which, however, were constructed by relatively few counties. Day labor was favored because it employs local men and more money stays in the county and because it made it possible to build up and maintain a force of trained men.

There was general agreement that day labor is more flexible and convenient than contract work and that it permits small jobs to be done without delay.

A majority of those reporting on the subject of control and planning considered the contract method better for estimating costs and for planning in advance as well as for controlling funds.

A relatively small number of engineers favored the contract method because it eliminated "petty graft and politics," while one felt that day labor was preferable for the same reason.

Many of those making a reply felt that there is a place for both the force account and contract methods.

In essence these men utilized contract construction for big excavation jobs and large bridges, neither of which most counties were well equipped to do, while day labor was employed on smaller jobs and on the usual work for which the county-owned equipment was adapted.

Necessarily most of the reasons for these beliefs were based on local conditions and local experiences.

### Summary and Conclusions

The day labor method may be used to advantage on public works where much employment must be given quickly and cost may not be an important factor. Day labor should not be used as an economy measure or to secure better or quicker construction at low cost.

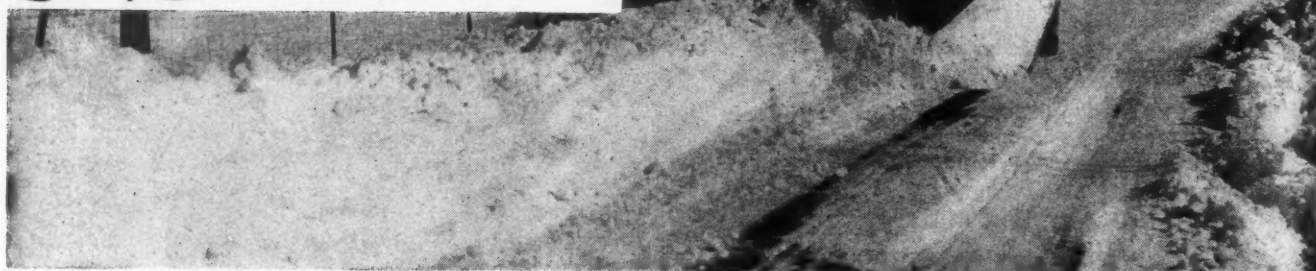
Types of highway work adapted to day labor methods include clearing and grubbing of right of way, clearing ditches and drainage structures, improving shoulders, removing obstructions to improve sight distance, widening curves, flattening slopes, resurfacing low type roads.

The day labor system of highway improvement is quite universally followed by town officials, officials of small cities, county authorities, and by State bodies when the work involved is classified as maintenance work.

Under the day labor system plans, specifications and detailed cost estimates usually are not available at the time of starting the project and the final cost may remain unknown until long after the work is completed.

The most widely used and most firmly established contract form of carrying on public construction is that of open competition on a lump sum or unit price basis and award made to the lowest responsible bidder.

# FRINK SNO-PLOWS



## "V" TYPE

There's a Frink "V" Type Sno-Plow for every size of motor truck from 1½ tons up to 10 tons capacity . . . 8 models of varying moldboard heights and three different widths at the cutting edge . . . so you can select a size that exactly fits your own snow conditions and the capacities of your trucks . . . without overloading them . . . and they are all self-ballasting . . . an exclusive Frink feature . . . available with or without side Leveling Wings . . . hand or full power hydraulic control . . . may be used interchangeably with the blade type Sno-Plow.

For whatever your need there's a FRINK V-Type or Blade Type Sno-Plow, equipped with every device for fast clean plowing, plus many exclusive FRINK features.

Post yourself on the latest snow-plowing developments with the FRINK catalog. Write TODAY.

## ONE-WAY TRIP BLADE TYPE

The Frink One-Way Trip Blade Type Sno-Plow is principally used in localities where the usual snow fall is not sufficient to require the use of a "V" type plow . . . made in four sizes . . . equipped with shock absorbing and self-tripping moldboard . . . reversible double wear cutting edge . . . hinged deflector to prevent snow from flying up onto the windshield . . . interchangeable with "V" type or Reversible Trip Blade type using same truck attachments.

CARL H. FRINK, Mfr., CLAYTON, 1000 Isl., N. Y.  
DAVENPORT-BESLER CORP., DAVENPORT, IOWA  
FRINK SNO-PLOWS OF CAN. Ltd., TORONTO, ONT.

# Time to order a carload of Good public relations!



State, county and city officials know the value of good public relations. They know, too, that the surest way to enjoy good public relations is to give good public service.

**S**TERLING "Auger-Action" Rock Salt will help hundreds of street and highway maintenance engineers give good public service this winter — just as it has helped them in many a winter before — by keeping roads and streets open, free from treacherous ice and snow. Despite critical shortages of manpower and equipment they know that Rock Salt can be depended upon to do a snow and ice removal job quickly, efficiently and economically.

Small wonder, then, that more and more states, counties and cities are turning to Sterling "Auger-Action" Rock Salt this year when roads and streets must be kept open to speed men and materials to the nation's war production plants.

Unless you are using Rock Salt for ice control on streets and highways within your area, take advantage of the offer below.

## Ask for Free Consultation On Your Ice Control Problems

Highway Departments save from one-third to one-half by using Sterling Rock Salt for ice prevention. Cities—large and small—have cut snow removal budgets—kept public and private transportation moving in winter's heaviest storms with Rock Salt. Write today for bulletin containing all the facts on the most efficient and economical solution to your snow and ice removal problems. Free consultation with an International Field Engineer upon request. International Salt Company, Inc., Dept. PW-2, Scranton, Pa.

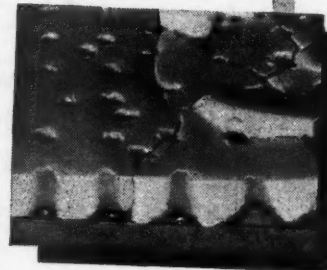
### ROCK SALT STOPS CAKING

Applied early in a storm, Rock Salt prevents snow from packing and bonding to the pavement — makes complete removal fast and easy. Keeping pavements *completely* free of snow and ice means real safety.



### "AUGER-ACTION" BORES IN

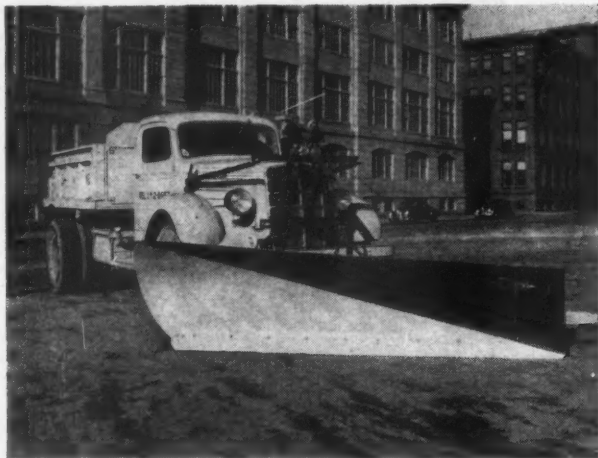
When ice has already formed, count on Sterling "Auger-Action" Rock Salt to bore right in and break it up. The model shows how the salt pellets bore right in, melt the ice and snow to form a brine which loosens the bond with the pavement. Removal by scraper is made easy.



# STERLING "Auger-Action" ROCK SALT

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## ANDERSON PLOWS

Are noted for two important advantages: fast clean plowing and ability to "take it" over long grueling periods.

Whether your requirements are for keeping open highways, streets, sidewalks, airports or industrial roadways there are modern Anderson plows which will exactly fill your needs. The best proof of their performance is the repeat orders from old customers for new Anderson plows.

### *Rugged, Modern Efficient*

ANDERSON plows are available for all 'round snow removal work and their rugged, modern design assures economical and efficient operation.

*Prompt deliveries can be made. Write or wire us for descriptive literature NOW.*

**ANDERSON ENGINEERING CO.**

21 CHARLES ST.

CAMBRIDGE, MASS.

*When writing, we will appreciate your mentioning PUBLIC WORKS*

The principal reason for the success of the contract system is that with other systems it is difficult to obtain the same loyalty and performance from material suppliers and employees that the contractor can secure.

Suitable equipment is essential to the success of either contract or day labor procedure.

Substantially all new Federal aid construction is carried out by the contract method using the unit price type of contract.

Substantially all new highway construction done by the State Highway Departments with or without Federal aid as well as street work done by the larger municipalities is by the unit price form of contract.

Experience covering the past 15 years appears to have justified the practice of prequalifying bidders. The practice is considered to be practical, helpful and capable of producing beneficial results.

The tests made by the Public Roads Administration to determine the relative economy and efficiency of highway construction by contract and by day labor show that construction by contract is more economical and more efficient than when done by day labor under the supervision of public agencies.

Briefly stated it appears that unless working conditions are favorable, supervision competent and the undertakings free from political and partisan interference, construction of new projects by day-labor is likely to be high in cost and low in quality.

### Postwar Traffic Problems

Post-war traffic problem number one, in the majority opinion of the nation's traffic experts, will be what the prewar motorist considered his headache—parking.

That is the consensus of a survey just completed by the National Conservation Bureau, accident prevention department of the Association of Casualty and Surety Executives.

To determine what principal traffic problems must be solved so as to expedite safe and efficient motor-vehicle and pedestrian flow after the war, a questionnaire listing ten traffic problems was sent recently to a representative list of motor-vehicle and transportation experts in all parts of the nation by the bureau's traffic and transportation division. The experts were requested to check, in order of importance, the three traffic headaches they considered most serious.

Returns were received from 77 cities, 48 states, 25 insurance companies, 20 federal and national organizations, 13 transit companies, and 62 other traffic engineers and officials. Replies revealed that the following problems were considered most urgent: (1) Parking; (2) Pedestrian control and safety; (3) Redesign of streets and highways; (4) Channelization of motor vehicle traffic; (5) Control of speed; (6) Improvement and installation of new traffic control equipment; (7) Solution of left-turn problems; (8) Street and highway lighting; (9) Transportation of war plant workers; (10) Public transit facilities.

There were considerable differences of opinion, depending on the type of work in which the authorities were engaged. Thus, city engineers found the parking problem of greatest importance, with pedestrian control and traffic channelization second and third, while State engineers listed redesign of streets and highways first, channelization of traffic second, and signs, signals and markings third.

Both city and state police considered pedestrians most important. City police considered parking second while State police considered speed second. Speed





## PLAN YOUR PLANT DRIVE NOW!

Good organization will be needed to sell the 6th. The task of raising the huge sum required will be the most difficult ever asked of Industry. As each new military success brings us closer to Victory, the public naturally will feel that the urgency of war financing is lessened—whereas it isn't. So organize now to prevent a letdown on the home-front from causing a letdown on the fighting front. Build your plant's payroll campaign around this fighting 8-Point Plan. You don't have to wait for the official Drive to start—swing into action NOW!

**1 BOND COMMITTEE**—Appoint a 6th War Loan Bond Committee from labor, management and each representative group of the firm.

**2 TEAM CAPTAINS**—Select a team captain, for each 10 workers, from men and women on the payroll—but not in a supervisory capacity. Returned veterans make most effective captains.

**3 QUOTA**—Set a quota for each department and each employee.

**4 MEETING OF CAPTAINS**—Give a powerful presentation of the importance of the work assigned to them. Instruct them in sales procedure. Have them carefully study the Treasury Booklet, *Getting the Order*.

**5 ASSIGNMENTS**—Assign responsibilities for:

(a) Music, speeches and announcements of the opening rally.

(b) Pre-drive letter to employees from management and labor.

(c) Competitive progress boards.

(d) Meeting schedules, etc.

**6 CARD FOR EACH WORKER**—Dignify each personal approach with a pledge, order, or authorization card made out in the name of each worker. Provide for a cash purchase or installment pledge. Instruct each captain to put a pencil notation on the card to indicate the subscription he expects to solicit from each worker.

**7 RESOLICITATION**—People don't mind being asked to buy more than once. Resolicit each employee toward the end of the drive in a fast mop-up campaign. Call upon your State Payroll Chairman; he's ready with a fully detailed plan—NOW!

**8 ADVERTISE THE DRIVE**—Use all possible space in the regular media you employ to tell the War Bond story.

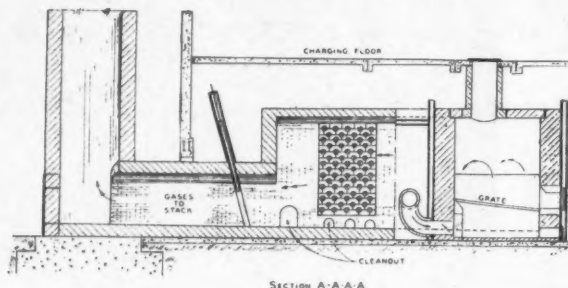
*The Treasury Department acknowledges with appreciation the publication of this message by*

## PUBLIC WORKS Magazine

*This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council*

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## "FITCH" RECUPERATORS FOR INCINERATORS



**AN INCINERATOR necessity is a good recuperator. "Fitch" Recuperators combine Thermal Conductivity, Great Strength and Accessibility.**

Write for Bulletin No. 11

**"RECUPERATORS FOR INCINERATORS"**

**FITCH RECUPERATOR CO.**

PLAINFIELD

NEW JERSEY

**for ACCURACY and TROUBLE-FREE OPERATION**

in WATER and SEWAGE TREATMENT  
and in Chemical Proportioning for  
all Processing Industries.

*Engineered and Manufactured by*

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**NATCO UNIFILTER TILE  
FOR TRICKLING FILTER  
SYSTEMS**

One piece  
underdrain  
Egg-shaped  
run-off  
Rapid,  
complete  
ventilation  
Salt glazed  
surfaces

**NATIONAL  
FIREPROOF-  
ING CORP.  
PITTSBURGH  
PA.**

When writing, we will appreciate your mentioning PUBLIC WORKS

took third place in the opinions of the city police and redesign was third with the State police.

Transit company engineers selected public transit facilities, pedestrians, and parking as their three most important items, while the national and federal officials placed parking first, redesign second, and the pedestrian problem third.

The questionnaire reveals that traffic experts are already planning to do all in their power to avoid return to the inadequate traffic facilities and hazardous conditions which were so prevalent in many areas in the past.

*Release by Association of Casualty and Surety Executives. Highway Research Abstracts, July, 1944.*

## Replacing 36-Inch Gate Valves

By **TIMOTHY W. GOOD**

General Superintendent, Cambridge Water Department

IN 1895 the Cambridge, Mass., Water Department laid a 40-inch steel force main 8,392 feet long from the pumping station at Fresh Pond to Payson Park reservoir, and 14,924 feet of 40-inch steel distribution main from this reservoir to the Cambridge Common, which is the distributing point of our entire system. A 36" Coffin gate valve was installed in this line at the Cambridge Common. In the Fresh Pond area two 36" Coffin gate valves and one 30" Coffin connecting gate were installed so that, in the event of trouble on one line, we would use either line for distribution or pumping. These gates required 456 turns to open or close. They were originally hand-operated but in 1921 electric motors were installed.

A few years ago we found that we were not getting a sufficient amount of water through the gate at the Cambridge Common and investigation disclosed that the interior of this gate had practically rotted out. As the Coffin valve people had retired from business and all patterns had been destroyed, it was impossible to obtain repair parts and I decided in 1937 to replace this defective gate with a 36" Rensselaer valve. Anticipating difficulty in inserting this, we requested the Rensselaer people to make the length between flange faces of this gate  $\frac{1}{4}$  inch less than was that of the Coffin gate. (The standard thickness of these flanges is  $2\frac{3}{8}$  in.) It was fortunate that we did so or we would have been unable to set the new gate in place without cutting out sections of the 40" steel pipe.

When it became necessary to use the 36" gates in the Fresh Pond area we found they were not functioning properly, and a thorough investigation disclosed that they were defective, and in 1943 the Water Board ordered their removal and replacement with two 36-inch Rensselaer gates.

After approximately forty-eight years of service, the old Coffin gates were practically frozen in on both ends of the flanges. We hired a crane capable of lifting thirty-five tons (the old gates weighed approximately 5 tons each) but found it impossible even to start the gates in their position, and it became necessary for us to dig underneath and use hydraulic jacks in order to get the gates started so that the crane might lift them out of the chamber. When the gates were finally removed, the force main gate was found to be opened one-third and the distributing main gate closed. Examination showed the entire interior of the gates had rotted out, and the stems had been bent.

Profiting by our experience in installing the Cam-



bridge Common gate, we likewise had these two Huron Avenue gates made one-quarter inch narrower than the flanges of the old Coffin gates. After the old gates had been removed, we succeeded in inserting new gates, using one lead and one paper gasket, and had same in operation eight hours after we started lowering the gates into the chamber.

With the necessity of supplying 12 to 19 million gallons per day, we were fortunate in having an auxiliary connection from the pumping station to the steel main on Huron Avenue. Were it not for this connection we would have found ourselves in a very embarrassing situation.

I have decided to have these large gates hand-operated hereafter, as with this method we are always able to determine whether gates are being opened or closed. (The Rensselaer gates require 252 turns to open).

With these replacements, our gates are now safe, and we can rely on their being opened or closed whenever necessary. Inasmuch as our consumption has jumped from 12 to 20 million gallons a day due to war work, we are indeed fortunate in having our system in proper condition.

## Postwar Sewage Construction

(Continued from page 44)

mated that the capacity should be quadrupled or quintupled. But the general average estimate was an increase of 70%.

### Mountain States

Extensions are expected to five Arizona plants, to cost \$880,000. The most extensive are at Glendale, which expects to add 2 digesters, a sludge pump, better gas control, sedimentation basin and flocculation. Four cities report present capacities totaling 19,300,000 gpd, while 1950 requirements are expected to be 32,500,000 gpd.

Not much sewage work is reported from Colorado. Additions include only a grit chamber, 2 sewage pumps, and grease interceptors. Three new plants are planned, two of them estimated to cost \$100,000 and \$200,000 respectively.

Only one Idaho city reports expected work—a 5 mgd plant for Idaho Falls.

Two New Mexico cities expect to do a little repair work, and one to double the capacity of an existing plant at an estimated cost of \$30,000 and build a new \$40,000 one.

One city in Utah expects to build a new plant at a cost of \$40,000, for treating 1.4 mgd.

Two Wyoming cities expect to build plants, one at an estimated cost of \$150,000, the other \$20,000.

### Pacific States

Thirty-four California municipalities report expecting to do postwar work on treatment plants, 23 of them to make additions to existing plants and 11 to build new ones. Additions include "development of sludge for fertilizer," new clarifiers, digesters, aeration tanks, grit chambers, comminutors, vacuators, biofilters, pumps, drying beds, lagoons, septic tanks. The estimated cost of 19 of these is \$7,990,127. The estimated cost of the 11 new plants is \$11,745,000.

That new plants and extensions to old ones are needed in California is indicated by the figures reported of present capacities of 23 plants—115,136,000 gpd compared to the 205,643,000 estimated to be needed by 1950. Probably the influx of war workers is largely responsible for this.

## 7 YEARS WITHOUT A BREAKDOWN OR MACHINE REPAIR

Mr. George W. Brown,  
Town Superintendent,  
Walworth, New York.

Dear Mr. Brown:

Just a few lines to thank you for writing.

It is gratifying to note that you have yet to buy your first actual repair parts for your General Excavator, particularly since this machine was shipped more than 7 years ago. Most folks would expect that a machine of that age, and with the service it has given, would be pretty well worn out — or would have required thousands of dollars in repair expenditures.

In all modesty, Mr. Brown, we do take pride in the way Generals can "dish it out" and "take it," and here's hoping you continue to have the best of luck with your machine. Here too, incidentally, is our promise that after the war, Generals will be better than ever!

Cordially,

THE GENERAL EXCAVATOR COMPANY.  
Don B. Smith, Sales Manager

DBS/rb

Behind this letter is the all-out performance of a General Excavator which has been in all-around municipal service since 1937... with the first repair part yet to be purchased! Here is strong basis for including GENERAL-built equipment in your postwar plans.



GEORGE W. BROWN  
Town Superintendent  
Walworth, N. Y.

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# WHY FLINK Ice Control IS 6 TIMES FASTER

Spreads at 12 to 20 miles per hour, without stopping until truck is emptied. Driver speeds rapidly toward icy streets and intersections, throws Flink spreader clutch into operation as spreading area is approached. Drives on . . . spreading as he goes. As danger spot is left spreader clutch is thrown out of operation. Entirely controlled from cab without stopping.



**Flink one-man self-feeding material spreader, Model WD3,** equipped with Flink clutch control, is today's best answer to the danger of sudden freezes and the shortage of men and equipment. One man driving a Flink equipped truck can rapidly bring under control many miles of icy streets and dangerous intersections. No stopping until truck is emptied. As truck driver spreads along the street he controls the entire operation of the spreader.

**Self-feeding.** No helper to rest up or warm up. Saves men and expense. Fits all

dump trucks. Attaches like original end gate. Spreads forward or backward, full or half width of streets, thick or thin, all materials up to 1".

**Does not limit use of truck.** Truck can be dumped as with original end gate, or spreader can be replaced by original end gate in 5 minutes. When not spreading material use dump truck for any other purpose.

**Flink Spreaders** are used for road, street and highway work, and for spreading agricultural limestone.

Write for complete literature.

## The FLINK COMPANY

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In Oregon, only two additions to plants are reported, one to add a clarifier, the other to increase the capacity from 2 mgd to 4 at a cost of \$100,000. Six municipalities expect to build new plants, four of them estimated to cost \$495,000.

Two Washington cities expect to enlarge their plants, one at a cost of \$200,000, the other of \$60,000. Three cities expect to build new plants, the combined cost of which is estimated at \$375,000.

### The Highway Research Board's Proceedings

The Proceedings of the 23rd Annual Meeting of the Highway Research Board maintains the high standard set by previous proceedings of this "cooperative organization of the scientific men of America." It includes 6 reports and papers on economics, 22 on design, 5 on materials and construction, 5 on maintenance, 8 on traffic and operations, 16 on soils, and 4 on aerial photography.

Of the papers on design, 5 dealt with concrete pavements, 10 with flexible pavements, and the remainder with culverts, signs, bridges and roadside development.

Those on materials and construction dealt with traffic zone paints, temperatures in concrete pavements, cement-treated bases and calcium chloride in concrete.

The 40 pages on aerial photography bring out a number of uses for this which are not generally considered. Use in regional highway planning is not so unusual but that for recording individual and distinctive patterns and textures of the different types of soil and rock in order to locate soil types and hard rock formations, is not common in highway work. This may show sites for borrow pits, suitable or unsuitable locations for roads, etc.

Aerial photographs also show soil patterns, such as gullies; surface drainage is a function of slope and porosity of the soil; color patterns often reflect ground water conditions.

### Handling Car Body Scrap

(Continued from page 25)

and forth, over and over until they were thoroughly flattened. A good many of the bodies were too large to be handled by man power and these were cut with an acetylene torch. Then they were loaded into railroad coal cars. We usually sold them direct to a man who owned a finish press, but sometimes direct to the mill.

The photograph shows a car being loaded with 47,400 lbs., there being some steel scrap in the bottom. The largest carload of strictly all body material was 46,000 lbs. and the smallest was 26,000 lbs. The loads usually run about 40,000 lbs.

This idea was original with the writer, but dealers in other towns came to see how it was done and in many cases asked us to go to their town and do the job for them. It has not only aided greatly in the war effort but has cleaned many unsightly places that otherwise would have remained as they were, and it has also paid dividends. For the heavy scrap we have received as much as \$900 for a carload; for No. 3 baling scrap, \$100 per car F.O.B. shipping point. On some of it we have only been able to break even, but on much of the greater part we have made a little money. The Mayor has been repaid, as stated, the Red Cross, U. S. O. and American Legion have received very liberal donations and we have ample money to carry on. Any money left when the job is finally completed will go to the Red Cross or some organization.

THICKNESS OF FLANGE (T) IN INCHES  
3  
3  
2  
2  
1  
1  
0





Lancaster, Pa., filtration plant gallery.

# The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

## Studies Of Distribution Systems

Large errors in any theoretical calculation of the capacity of an existing distribution system may be caused by valves unintentionally closed, pocketing of air at high points, errors in the records as to connections, hourly and seasonal variations in rate of flow, and changes in both domestic and fire demand. Two practical ways of determining need for additional capacity are water plane surveys and fire flow tests. The former involves pressures taken or recorded at various points in the system where the elevation is known, and from these determining the water plane at those points. Where there are marked depressions in the water plane the need for special study is indicated. Several cities are basing their plans for extensions of the arterial system largely on water plane studies.

In making fire flow tests, groups of 4 to 6 hydrants each are selected along the larger mains, and the pressure at a central hydrant of each group measured, both static pressure and that during a flow test when each hydrant of the group is discharging 1,000 gpm or less.

The minimum size of pipe for residential districts should be 8", or 6" if there is a good gridiron system and in lengths of less than 600 ft. There should be more than one artery, in different streets, laid by the shortest routes to the points of heaviest demand.

Elevated tanks serve as a secondary source of supply

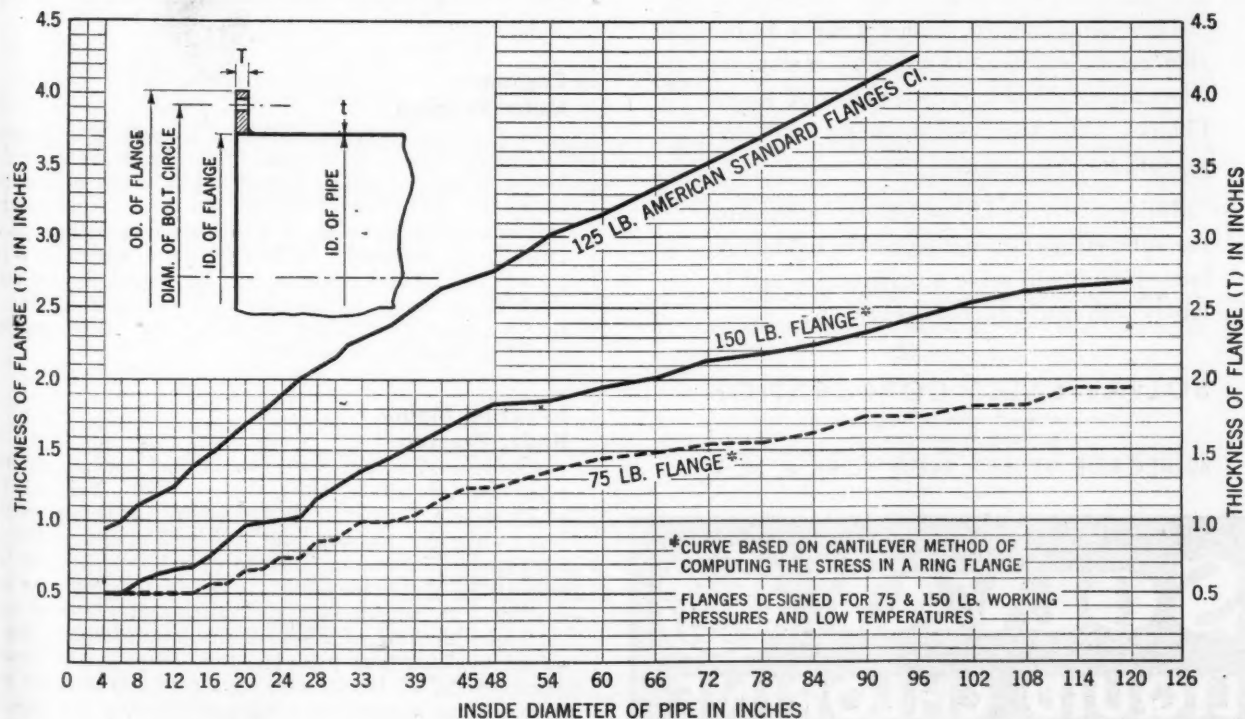
for fire protection and peak consumption, at comparatively modest cost. Connections to them should be not less than 6" for a 100,000 gal. tank, 8" for a 500,000 gal., 12" for a 1 mg tank, 16" for 2 mg, and 20" for a 5 mg. Tanks should be in the sections of heaviest demand, either domestic or fire.<sup>A112</sup>

## Flanges For Steel Water Pipe

There are no recognized standards for steel pipe flanges larger than 24" diameter. Moreover, the A.S.A. standards for small pipe were designed for pressure-temperature ratios far in excess of waterworks requirements, none for less than 150 psi or temperatures lower than 200°F.—probably three times that ever found in water pipe. The author presents designs for ring flanges attached to the pipe by fillet welds, for pressures of 75 and 150 psi and temperatures not exceeding 200°F., which have proved satisfactory for years, are economical, and can be fabricated by common tools.<sup>A113</sup>

## Michigan Aids Postwar Planning

The Michigan Public Improvement Fund Act appropriates \$5,000,000 to cover half the cost of preparing surveys, plans and specifications for public buildings, highways, publicly owned and operated utilities for postwar



Ring flanges for low pressure, low temperature service.

Courtesy Journal Am. W. W. Ass'n



# FIRST AID FOR SICK WATER

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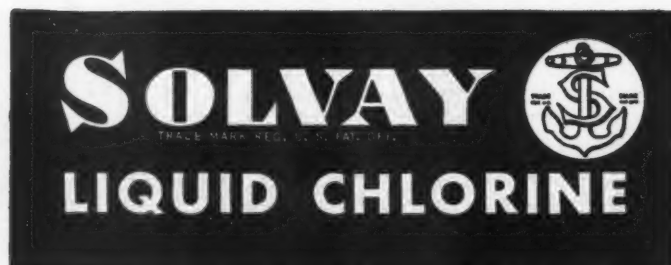
Treat germ-laden, dirtied water with this chlorine bactericide—impurities, foul taste and odors are rendered harmless. SOLVAY Liquid Chlorine is the Army and Municipal Engineer's first aid for sick water.

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employment. One million of this is for public improvements in cities, villages and townships on the basis of population, and three million on the basis of the ratio of the unit's population to the total state population plus the state school census. To collect the 50% reimbursement, the plans must have been completed and approved by the State Health Dept. or other appropriate state agency.<sup>A114</sup>

Today no one knows whether or not there will be any federal or state funds to aid postwar work. "So, as the starting point, why not forget the question of financing? We certainly cannot finance anything until we know what we want and get that want into a practical form—itemized, summarized and blueprinted."<sup>A115</sup>

## Corrosion Of Well Pumps

A study by the Illinois State Water Survey during the past ten years indicated that 40% of the municipal water superintendents of that state had corrosion problems; that nitrates in excess of 10 or 15 ppm are excessively corrosive, particularly to copper and brass; chloride concentrations in excess of 100 to 150 ppm frequently cause corrosion, also sulfates in excess of 200 to 300 ppm. Corrosion of well pumps is very erratic and no one knows the reason; some attribute the corrosion to galvanic action, others to stray currents, water quality or pump design. Galvanic action may be caused by a copper air line in contact with the column pipe, by copper wire used to bind the air line to the column pipe, by bronze impellers in cast-iron bowls.

Corrosion has been prevented by coating the column pipe with bitumastic paint biannually; by using cast-iron impellers in cast-iron bowls. R. H. Wasson (Fairbanks, Morse & Co.) said that corrosion is accelerated if the protective coating formed by corrosion is removed by velocity of water through the pump or abrasion; varies with the proximity of the electrodes to each other; increases with stress in the metal, and with distance apart in the electrochemical series of the metals used. He recommended that the fewest possible kinds of metal be used in a pump; for example, all bronze with a monel or stainless steel shaft. All-bronze bowl with steel column carefully coated with bitumastic is a practical combination.

Cathodic protection has been used. One installation, after 31 months' service where a steel column pipe formerly had to be renewed frequently, showed no corrosion on either shaft housing or column pipe.<sup>A106</sup>

## Customer Meter Reading

In 1943 the Indianapolis Water Co. put into operation a customer mail-in meter reading plan to provide for difficulty of meter readers failing to get access to premises where the entire family was in war work. Also monthly readings are being made of 450 meters in defense plants to which the company's readers are not admitted. It is expected that 20,000 readings will be mailed in this year. A check up shows no instance of a customer sending in fake readings or running the meter dial back, and less than 5% were inaccurate.<sup>A118</sup>

## Lowering Mains Under Pressure

Brookline, Mass., lowered two parallel lines of cast-iron pipe, one 14" laid in 1874, the other 20" laid in 1893, which were 42" apart; 750 ft. of each line being lowered 5 ft., while the pressure head remained at 140 to 180 ft. A concrete pier was built under each joint to receive the pipe at the new grade, then a trench was constructed extending 3 ft. outside each line, alternate bells were supported by blocking of 2" x 10" plank on the piers, and a second blocking was placed a foot away and 3" lower. Three of the 2" blocks were then carefully knocked out from all the supporting blocking, allowing the pipe to settle 3" onto the other set of blocking, this being done along the entire 750 ft. Thus, alternately lowering the





# IMPORTANT

## Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

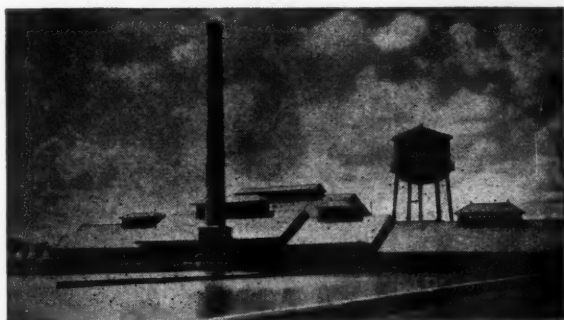
However, the problems of maintaining

public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps*. General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

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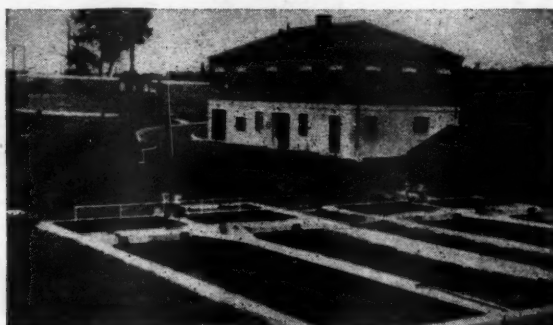
General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-*

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When you need special information—consult the classified READER'S SERVICE DEPT., pages 79-81

blocking, the two pipe lines were lowered the 5 ft. in 2 hr. 50 min. without any leaks developing.<sup>J18</sup>

### Pleasing Design Of Pumping Station

The Tory Fort Lane booster pumping station at Worcester, Mass., had to be located in a residential section and was made to look as much like a residence as possible, even to having monk's cloth draperies at the windows, which caused it to be called a "lace curtain" pumping station. The architecture is English cottage style, with weathered brick chimney and walls, laid in pattern between redwood timbers in the gables. The bricks used were reclaimed from brick sidewalks that had been removed. The station contains a 300 gpm centrifugal pump with 40 hp motor, and two 1,000 gpm centrifugals as auxiliaries. Water is pumped to a reservoir, the height of the water in which automatically starts and stops the pump.<sup>G38</sup>

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### Development Of Rock Wells

Since 1941 Ridgewood, N. J., has constructed 7 wells in the local red sandstone formation, and each well had its capacity increased 32% to 180% by agitation. The walls of the 12" wells were thoroughly scrubbed for their entire depth to remove loose particles, using a steel brush. Then, using a 5 ft. nipple and a 20 ft. steel cage at the end of an 8" pipe provided with a plunger, a surging action was created, confined to the 20 ft. cage, which washed out sand, clay and pieces of rock. The cage was lowered 20 ft. and the process repeated until the entire depth had been scrubbed. As much as 4 cu. yds. has been removed from 350 ft. of 12" well.

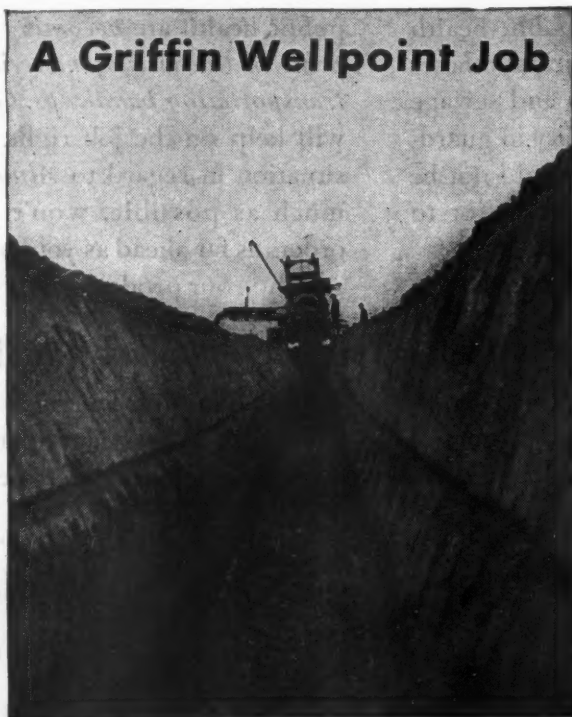
This development increased the cost of the well by 60%, but it decreased the cost per gallon of water delivered by 15%; also it decreased considerably the cost of equipment needed, since 11 developed wells deliver as much water as 20 not developed.<sup>G35</sup>

### Placing a 708 Ft. River Crossing

Wilmington, N. C., obtains its water supply from a branch of Cape Fear river where the salt content sometimes runs as high as 2400 ppm., but is now completing a pipe line to an intake 21 miles further up the river and above a lock, thus eliminating tidal water. This is 30" Lock Joint reinforced concrete pipe except for three cast-iron stream crossings. One of these is 708 ft. long across Cape Fear river. It was pulled across as one unit, which weighed over 200 tons. The line was jointed together with lead-run flexible joints on a launching way of two lines of greased railroad rails laid on a 4% slope. To make the line buoyant when it entered the water, over 400 50-gal. drums were tied to the pipe at uniform intervals. The pipe was pulled across by two hoists, a steam hoist on the far side and a gasoline one on the launching side. A cable from the latter extended through a block near the shore and then back to the rear of the pipe line, so as to push the pipe into the water and eliminate the danger of pulling the joints apart. Several days were lost in making the actual launching due to broken cables and other delays; but when it was once started the whole line was pulled into place in a single day. A diver then cut the drums loose. No leaking joints were discovered.<sup>E18</sup>

### Inserting Valve In 24" Cement-Asbestos Pipe

The Passaic Valley (N. J.) Water Commission recently inserted a gate valve in a line of 24" Transite pipe while it remained under pressure. First, a temporary brick and concrete pier was built under the pipe about 2 ft. each side of where the valve was to go. To hold the pipe rigidly in place during the operation, initial cuts were made about halfway through the pipe; then the two halves of the valve were placed, the hub ends poured with lead and calked, the machine dome attached to the valve body, the cuts completed, the cut-out piece removed and the valve dome bolted in place. Finally a permanent pier was built under the valve.<sup>E18</sup>



**A Griffin Wellpoint Job**

### Protect From A

The formed fertilize formed dust hav in 4 to veloping of conc silica sa pressure covered

### Postwa Service

There necessita as exten will be n ections, greater the other should b

### St. Pau Distribu

Groun by 340 levels—t river lev cludes th sale sect level sec the resi areas are valves. closed e placed i piece of box is de ating cr is jointe Dresser departme cavators ment. P much as poor, en used for laid onl graded laid, not

All va brick ma geared a bevel ge generally Extra-str 2" was u copper t has been stall all property for 30 y 6 men a truck w crew con does hyd man and cellaneou crews co vided w gate wre truck eq driven p centrifug for nigh steam boi



Protecting Pipe From Acid Soil

The lower part of Charleston, S. C., is made land formed by dumping ashes, sawdust and cinders from fertilizer acid plants onto ocean bottom ooze. The acids formed from the pyrites and ash fills and decaying sawdust have completely eaten through cast iron water pipe in 4 to 12 years. This is now being prevented by enveloping the pipe at the foundry with a 3/8 inch thickness of concrete, mixed 1 part portland cement, 1 part clean silica sand and 2 parts graded limestone, applied under pressure. After the pipe joints have been made, they are covered in the trench with similar concrete.<sup>F63</sup>

Postwar Service Connections

There will undoubtedly be a postwar housing boom, necessitating large numbers of house connections as well as extensions of mains. There probably will be no Federal grants for house connections, yet the cost of these will be greater in most cases than that of all the other extensions. Wartime earnings should be set aside to meet this cost.<sup>A116</sup>

St. Paul's Water Distribution Practices

Ground elevations of St. Paul vary by 340 ft. and there are three main levels—the bottom lands just above the river level; the middle level, which includes the principal business and wholesale sections; and the plateau or high level section, which includes most of the residential areas. The high-level areas are separated from the low by gate valves. Since these should always be closed except in emergencies, there is placed in the gate box or manhole a piece of 4 x 4 timber as long as the box is deep, as a warning to gate-operating crews. In general, cast-iron pipe is jointed with lead, steel pipe with Dresser couplings. Mains are laid with department men using compressors, excavators and other up-to-date equipment. Pneumatic equipment is used as much as possible. Where the soil is poor, enough sand to cover the pipe is used for backfill. Permanent mains are laid only on graded streets. On ungraded streets, temporary mains are laid, not larger than 2".

All valves 20" and larger are set in brick manholes. The 20" ones are spur geared and set vertical; larger ones are bevel geared and set horizontal, and generally provided with bypass valves. Extra-strong lead pipe in sizes up to 2" was used until 1925 but since then K copper tubing with mechanical joints has been used. Department crews install all service pipes from main to property line, and maintain them free for 30 yr. Each service crew contains 6 men and is equipped with a 1 1/2 ton truck with supplies. A maintenance crew consisting of foreman and 5 men does hydrant repair, another of foreman and 3 men does all valve and miscellaneous repair. Equipment for these crews consists of a 2 1/2-ton truck provided with a gate-operating machine, gate wrenches and repair tools; a 1-ton truck equipped with tools, two gas-driven pumps, one diaphragm and one centrifugal; two portable light plants for night emergencies, and a portable steam boiler for thawing hydrants.<sup>F62</sup>

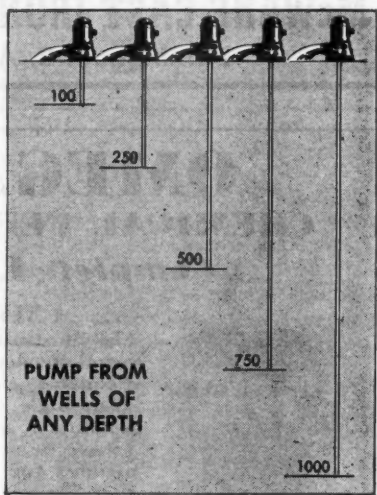
Bibliography of Waterworks Literature  
The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.  
c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

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  - 115. Postwar Planning. By John M. Hepler. Pp. 989-990.
  - 116. Postwar Financing in Michigan. By Richard A. Sullivan. Pp. 991-995.
  - 117. A Study of Water Rates in Michigan. By Louis E. Ayres. Pp. 998-1001.
  - 118. Customer Meter Reading Calendar. Pp. 1002-1004.

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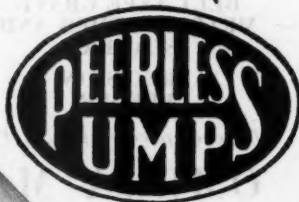
Water levels are receding in many parts of America. This critical situation was discussed most forcefully in a recent issue of The Saturday Evening Post. It's a problem that confronts many pump users—perhaps you.

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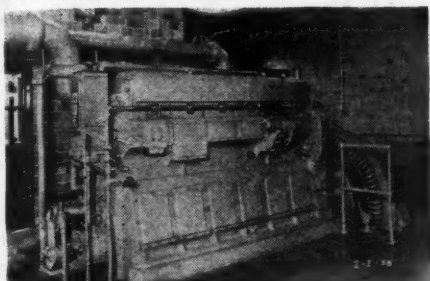
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27. p. Water Supply Control and Development. By Alfred B. E. Blackburn. P. 361.
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16. Principles for Public Works Programs. By M. W. Torkelson. Pp. 85-88.  
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63. Concrete Envelope Protects Cast Iron Pipes in Acid Soil. By James E. Gibson. Pp. 1060, 1062.  
64. Sanitary Control in Florida of Water Supplies. By J. B. Miller. Pp. 1066, 1068, 1071, 1110.  
65. Purification by Excess Lime at Newton Falls, Ohio. By Rollin F. Macdowell. Pp. 1079, 1080, 1083.  
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67. Forecast of Postwar Activities. By William J. Downer, F. H. Waring, Warren J. Scott, K. C. Lauster, J. B. Harrington, C. G. Gillespie, James M. Doughty, Jr., Howard M. Hurst, J. M. Jarrett, Raymond J. Faust, H. B. Foote and L. F. Warrick. Pp. 1131-1135.  
68. Valve Inserted Under Pressure in Large Cement-Asbestos Pipe. By Richard E. Bonyun. Pp. 1136-1137.  
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34. Charts for Determining Equivalent Pipes and Loop Flow Distribution. By H. W. Clark. Pp. 313-317.  
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36. Examining 100 ml. Portions of Water. By H. W. Poston. P. 321.
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2. Upper Mississippi River Flood of 1944. Pp. 8-20.  
3. Two-Stage Treatment Provided at the Marceline Water Purification Plant. By Glenn C. Fox. Pp. 21-23.  
4. Maintaining and Painting Steel Water Tanks. Pp. 27-42.

## California's Postwar Program

The postwar building construction program of the State of California will, in all likelihood, have money in the treasury to pay its costs, before actual construction begins. In adopting Governor Warren's program, the Legislature established a savings account of \$112,000,000 for necessary construction work and as an employment reserve. \$62,000,000 of this is a postwar fund based on tax percentage and \$50,000,000 is a General Fund surplus.





Six-cylinder sewage gas engine generating electricity at Ft. Dodge, Ia.

# The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

## Chlorination of Cleveland's Effluent

The effluent from the Easterly treatment plant of Cleveland, Ohio, is discharged beyond a breakwall about 1,000 ft. from the shore line and normally carried eastward by the prevailing winds. There are six bathing beaches along the shore and during each bathing season bacteriological and microscopic analyses of the water at these beaches are made. The plant effluent is chlorinated sufficiently to maintain a residual of 0.5 to 1.5 ppm and the total bacterial count in the chlorinated effluent averages about 50 and the coliform bacteria are always zero. In the three years the plant has been operating, a 91% reduction in pollution of the bathing beach waters has been effected. Moreover, the effluent is much cleaner than the shore water of the lake and the chlorine residual has a pronounced sterilizing effect on the adjacent lake water.<sup>C26\*</sup>

## Effect Of War On Chemicals

Use of bauxite for war purposes made it necessary to use only ores of high silica and iron content for making aluminum sulfate for water and sewage treatment. In 1942 the A.W.W.A. adopted emergency specifications for this, permitting 17% less alum, 4 times as much iron and 30 times as much insoluble material. The manufacturers have developed new methods of manufacture and are producing much better aluminum sulfate than had been anticipated, averaging only 8% less water-soluble alum and 5 times as much iron and insoluble matter. Some operators obtained better results than with prewar alum, probably because the insoluble particles provided nuclei for the floc.<sup>C78\*</sup>

Chlorine can not be adulterated—it is as pure today as before the war. The government allowed sewage and water plants to use their prewar requirements. But containers were scarce and a quick turnover of them was necessary, and users returned them more promptly than formerly but improvement in this is urged.<sup>C79\*</sup>

Ferrisul was demanded in large quantities by manufacturers for removing annealing scale, rubber manufacture, etc., and little was available for sewage and water treatment; but this demand has decreased and the manufacturing capacity increased and there is plenty available now.<sup>C80\*</sup>

In the case of hydrated lime, the chief problem has been labor; scarcity of this reducing the output 40%. But the manufacturers expect to be able to supply sewage and water plants with the same quantities as before and of even better quality.<sup>C81\*</sup>

## Research Projects In 1944

A list of sewage research projects under investigation and requiring study in 1944 has been compiled. Of those under investigation, 35 were concerned with sewage, 49 with industrial waste, 5 with stream pollution and 5

with methods; an increase of 20% over last year for industrial waste and a decrease of about 50% for the other three. Of those dealing with sewage treatment, 10 had to do with sludge (33 last year); 8 with filtration (5 last year); and 9 with activated sludge (7 last year). Of those dealing with industrial wastes, oil, rubber and food wastes received much more attention than last year; other wastes about the same.

Problems requiring investigation are listed as: sewage, 15 (14 last year); industrial wastes 17 (12 last year); stream pollution, none (3 last year); analytical methods 9 (2 last year). Regarding the last it was said: "The needs of the man who has to produce results, for simpler and quicker determinations, have been neglected to a point where even the better operators began to lose interest and abandon the performance of routine tests. . . . I believe that inventive genius is not lacking in the sewage works profession to devise sound, simple and rapid methods that will answer the needs of operators." Three of the 9 analytical methods were for determination of solids content.<sup>C82\*</sup>

## Cyanide And Activated Sludge Treatment

Studies conducted on the effect of polysulfide-treated cyanide case hardening, copper plating and zinc plating wastes on the activated sludge treatment showed that certain amounts of these could be tolerated by this process before serious impairment of the quality of effluent occurred. Nitrification was practically unaffected until 1,000 ppm of polysulfide was added. There was no disintegration of the activated sludge or change in the settling characteristics of the floc. Even when over 2,200 ppm impaired normal purification activities, the supernatant liquor generally returned to normal in two days or less.<sup>C83\*</sup>

## Utilizing Gas From Imhoff Tanks

The San Angelo, Texas, treatment plant contains three Imhoff tanks, the gas vents of which are covered and the gas collected and used to operate a 25 hp gas engine direct connected to a centrifugal sludge pump; also gas is used domestically in three residences, and for incinerating screenings. The gas vent cover is a horizontal flat slab placed with its bottom 3" below the normal water level to keep the scum submerged. Constant movement of the scum caused by escaping gas prevents its getting very thick or dry, except on rare occasions, when it is drawn off. Covering the gas vents does not reduce the efficiency of the tank, eliminates scum troubles in operation, controls foaming, and has caused no objectionable features.<sup>C85\*</sup>

## City Cleans House Connections

Bay City, Mich., cleans house connections, flushing and augering them for a nominal charge of \$2.50 to \$3.00. For this service it has a truck which contains a 600-gal. water tank, a pressure pump with gasoline engine and several lengths of 2" hose. It can maintain a pressure of

\*See Bibliography in the September issue.

50 lb. in a service while flushing it. There are approximately 14,000 sewer connections. In 1943, 2,227 of them were cleaned, 1,630 by flushing and 305 with flexible auger.

The sewers are cleaned according to a regular schedule, with additional cleanings of certain sections when needed. Two crews of 3 men each do this work using Champion power sewer cleaning machines. In 1943 this cost 6.81 cts. per ft. for 8" pipe, 6.38 cts. for 12" and 11.8 cts. for 18"; an average of 6.73 cts. for all sizes.<sup>H38</sup>

### Rebuilding A Sewer In Service

A 300 ft. length of old 30" brick sewer was so out of grade it was decided to rebuild it. Meantime the sewer had to continue in service, and a bypass was built to carry 3 to 10 mgd of sewage, being a box flume of plank lined with heavy tar paper placed in a trench about 3 ft. from the old sewer, and connected to it at each end. Then the

old sewer was removed and a new one built of reinforced concrete pipe. To replace the openings in the old sewer made for the bypass, a sheet of galvanized iron was placed against the inside of the wall for a form, and concrete of quick-setting cement poured around the outside.<sup>G28</sup>

### Standard And High-Rate Filters

Spartanburg, S. C., in 1942 placed in operation an aero-filter of 2 mgd rated capacity to supplement a 3 mgd standard filter built in 1930. During a 5-month test the older filter produced reductions of 78.5% in B.O.D., 81.6% in suspended solids, and 40.6% in total solids; the new filters produced reductions of 81.2%, 84.7% and 44.9% respectively. The construction cost of the new filter per million gallons rated capacity was 24% that of the older filter.<sup>J14</sup>

### Chlorination For Filter Pooling

Rotterdam, N. Y., operates two 34 ft. filters with rotary distributors built in 1940. After three years of operation, pooling gave trouble. Fire hosing gave only temporary relief—it did not reach deep enough. Chlorine was applied from 11 P.M. to 8 the following morning at the rate of 52 ppm giving a chlorine residual of 40 ppm. This gave a bleached appearance to the formerly black stone for a depth of 6" only, so a second dose was given the next night at 60 ppm and the stone then was found to be clean for a depth of 3 ft. Nitrification of the effluent rose from 15 ppm to 25 ppm; dissolved oxygen remained at 4.4 ppm. During the next 30 days nitrates dropped to 10-20 ppm and dissolved oxygen to 1.0 ppm, but both returned thereafter.<sup>H37</sup>

### Vacuum Filtration At Springfield, Mass.

The Springfield treatment plant elutriates the digested sludge, which is then conditioned and vacuum filtered. The cake is dried or completely burned in a Raymond flash drying incinerator. Both ferric chloride and aluminum sulfate have been used for conditioning. The alum floc is easily formed and larger than that formed by ferric chloride but is far less stable. The alum is cheaper, but alum floc crushed against the cloth, becoming so dense that further dewatering was prevented and the cake often contained as much as 70% moisture. With ferric chloride, moisture contents as low as 60% were common and, with heat at a premium, the advantage seems to lie with this conditioner.

With elutriation, the ferric chloride dose has averaged only 1.5%. Keeping clean the buckets that deliver the sludge for conditioning is important, for the chemical feeder is operated by the elevator and assumes the buckets have a constant capacity; but if the bottoms of the buckets are allowed to fill with grit and the capacity thus reduced, there will be a waste of chemical. Violent agitation is not necessary or desirable in conditioning the sludge.

The 12 oz. wool filter cloths used have an average life of 600-700 hr. The cause of blinding appears to be oil and grease. This has been successfully



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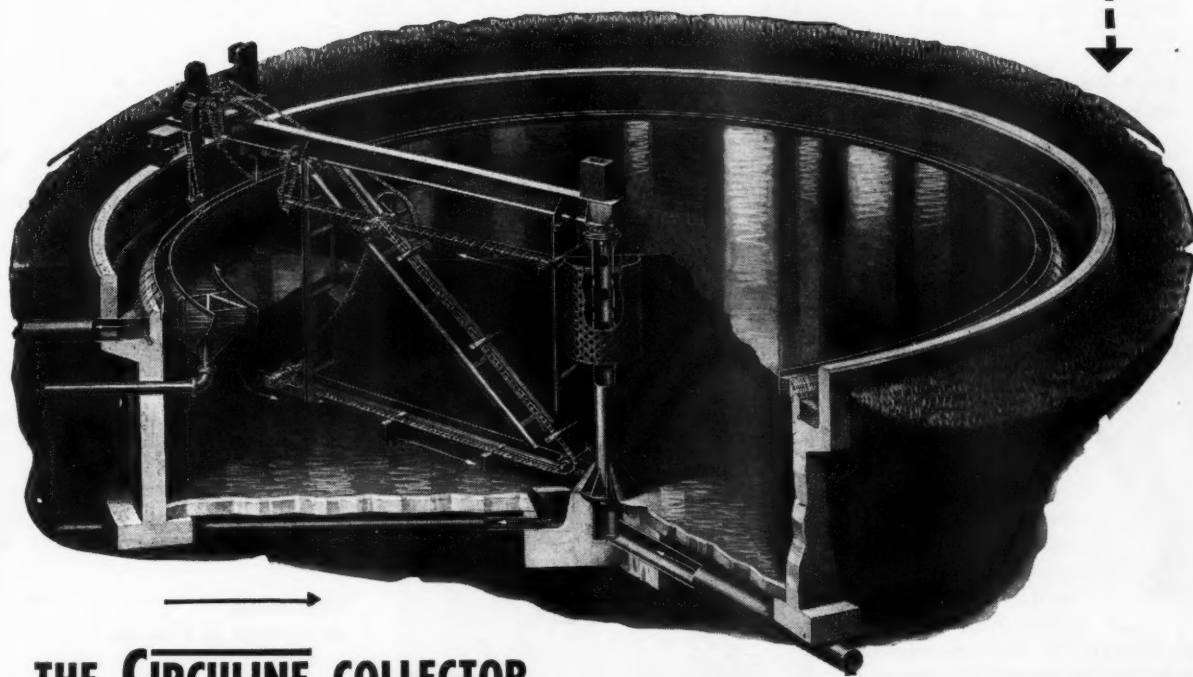
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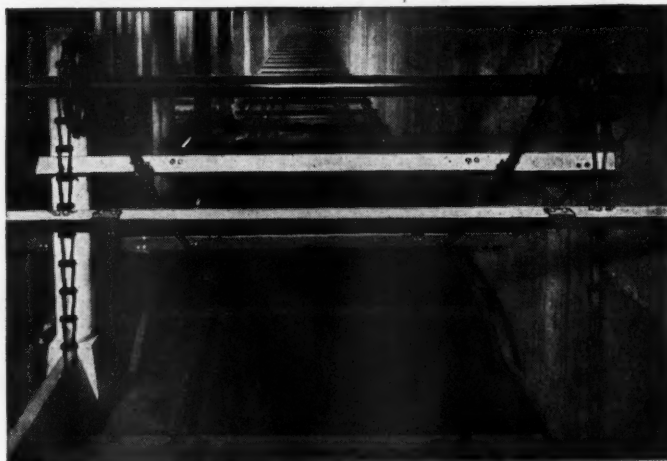


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removed by solvents, but the nap has been pretty well destroyed and the production rate decreased, and cleaning is not considered economical.

A contract has been made with a commercial fertilizer company to sell one year's output of flash-dried sludge—about 1200 tons—at \$5 per ton f.o.b. plant.

About 5,500,000 lb. of sludge solids is removed to the digester per year, and 2,500,000 removed from the digester. The total gas production is 42,000,000 cu. ft. per year.<sup>C89</sup>

### High-Rate Activated Sludge Treatment

Experience has shown that periods of aeration shorter than those used in standard activated sludge plants can produce effluents of various degrees of purity intermediate between that from plain sedimentation and that from standard activated sludge. The design of high-rate plants

must provide for flexibility of operation to meet changing conditions. High-rate treatment is susceptible to changes in quality of sewage, but can adapt itself to these changes more readily than standard treatment. Where conditions warrant, the high-rate activated sludge treatment offers a means for substantial economies in construction and operating costs as compared with standard activated sludge.<sup>C90</sup>

### Grease In Sewage

A development of inestimable value in the whole problem of grease removal would be a more rigid standardization of grease content measurement. The current standard method allows the use of any of three solvents for extraction, and it is necessary to know the solvent used and make allowances for the general relation between the results obtained by the different solvents. Also it is necessary to define more definitely what substances are to be included under the term "grease." Until this is done it seems logical to choose chloroform as the single solvent, as it generally gives the highest result.

When using the grease test for measuring efficiencies in biological treatment devices, it must be remembered that the starting material may be entirely worked over and the final product still be soluble in the fat solvent.<sup>C91</sup>

### Financing Sewerage In Florida

Few Florida communities can finance sewerage construction by means of general obligation bonds because no homestead can be liable for debt service unless assessed at more than \$5,000, and at least 50% of the freeholders must vote for them. Special assessment bonds can be issued only if all or a large majority of the freeholders petition for the improvement. Financing by existing revenues is impracticable for most communities of the state. That leaves only revenue certificates based upon sewer service charges. In 1935 the State Legislature passed an act to provide for this, the certificate to be a lien only against the property and revenues of the utility, and not to extend longer than 30 yr. from the date of sale, to be sold for at least 95% of par value, and bear interest not to exceed 6%. The municipality may require all persons within a sewer zone to connect to the sewers, and such zone may extend outside the corporate limits for not more than 5 miles, but not into another incorporated city or village. A number of communities are operating under this program, including Tallahassee and Clearwater.

The monthly charges are graduated. Small individual house connections are charged at a nominal rate and larger buildings and large water users pay at a higher rate. Some communities favor a charge based on water consumption in which the user pays at an established rate per thousand gallons of water consumed each month. In some places where the water utility is privately owned, satisfactory arrangements have been effected for the private utility to collect the sewer rental charge in conjunction with the water billing.<sup>C92</sup>



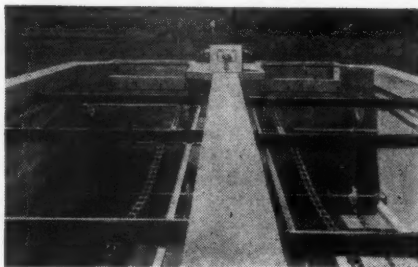
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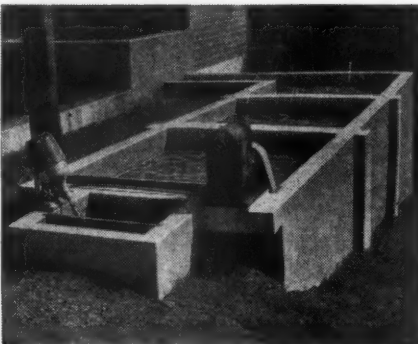
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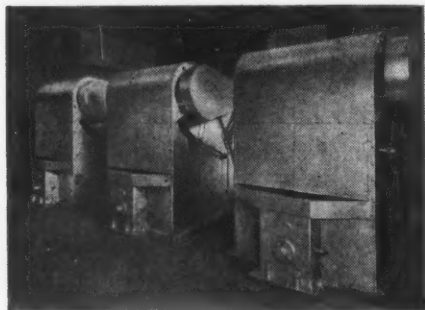
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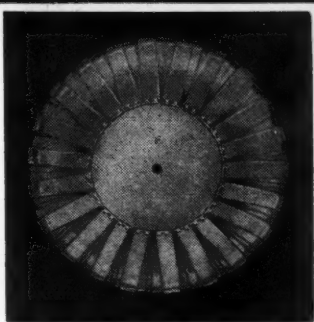
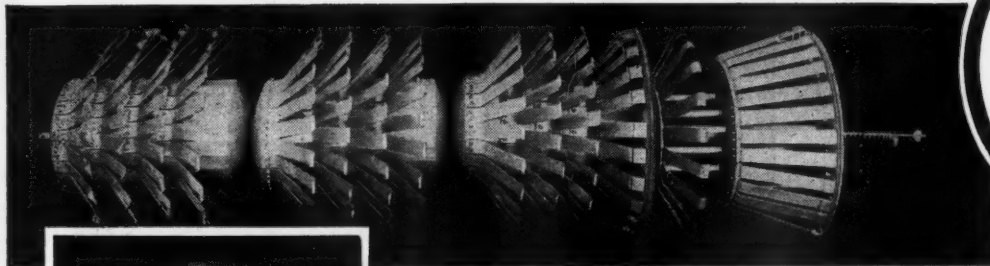
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89. Sludge Disposal Experiences at Springfield, Mass. By John D. McDonald. Pp. 872-877.
90. High-Rate Activated Sludge Treatment of Sewage. By E. Sherman Chase. Pp. 878-885.
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  107. Operation of Diffused Air Activated Sludge Sewage Treatment Plants Serving Army Camps. By John E. Koruzo. Pp. 978-985.
  108. Municipal Rose Garden at Hickory, N. C. By P. L. Abernethy. Pp. 986-988.
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## Keeping Up With New Equipment

### "Jeep" Fire-Fighter Effective in Tests at Willys-Overland

A fire-fighter "Jeep"—designed to protect industrial plants and to serve as an auxiliary unit for urban and rural fire companies—has qualified for a place in America's post-war safety plans during 18 months of experimental service.

The new unit was developed by engineers at Willys-Overland Motors from an early test model of the Jeep, according to S. E. Gregorek, fire protection chief for the company, who said it has been patrolling the auto plant's more than two million square feet of floor space since January 1943.

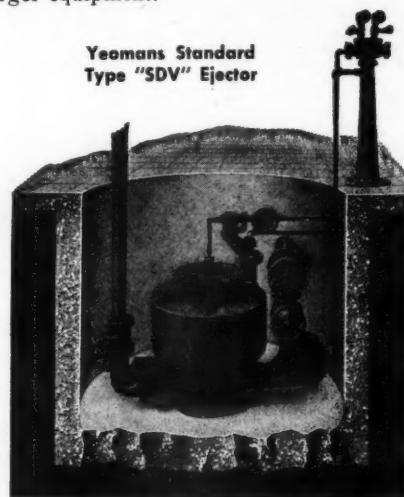
During exhaustive tests, he explained, the "blaze-blitzing" Jeep has answered 34 emergency alarms, bringing all fires under control before any serious damage was done.

Describing the Jeep as "the most compact fire-fighting unit," Mr. Gregorek said the vehicle has been driven on elevators and carried to every section of the plant from the basement to the roof. In other instances, it has climbed stairs, raced up inclines and coasted down chutes in transporting its three-man crew to areas of trouble.

Painted a bright red and outfitted with shiny brass and copper accessories, the Jeep is equipped with 350 feet of 2½ inch hose; two nozzles; two extinguishers; a 500-gallon-per-minute pump; and two lengths of suction hose, the latter to draw water from reservoirs, creeks and sewers.

Discussing its post-war application, Gregorek pointed out that in larger cities the Jeep will be able to get to a fire and hold the blaze under control until the heavier and less maneuverable units arrive. He said the unit should prove a boon to small communities which cannot afford larger equipment.

Yeomans Standard  
Type "SDV" Ejector



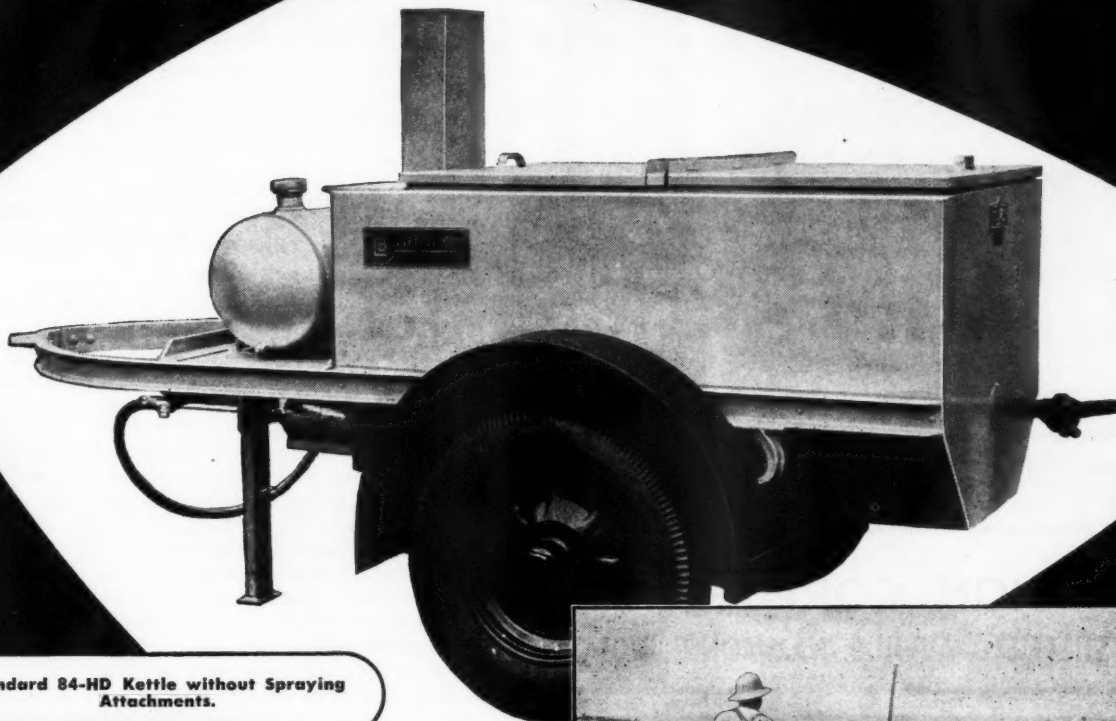
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The City of Columbus, Ohio, employs a successful solution with installation of Yeomans-Shone type "SDV" pneumatic ejector for pumping the scum and grease from the clarifier tank. Installed in 1937, the ejector has been in constant use since then with no trouble from clogging.

Pumping 150 gpm to a 20 foot head, the Columbus ejector was designed and built for the job. The scum and grease-laden liquid enters the receiver from the top in-



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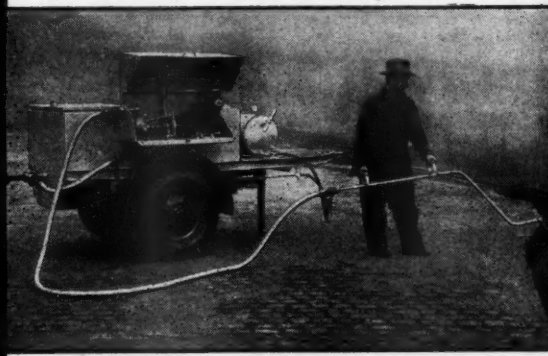
The 84-HD Kettle is economical to operate due to the patented features, "Double Heat Circulation System" and the "Screened Reservoir." These features make it possible to utilize all the heat from the Littleford Torch Type Burner and to give a continuous flow of materials ready to draw off at all times. 84-HD Kettle is sturdily built, easy to trail at high speeds.

With a Hand Spray or Motor Spray Attachment, the 84-HD becomes an even more efficient unit. The Hand Spray Attachment makes the 84-HD Kettle a two man spraying unit; with a Motor Spray Attachment, the 84-HD is a one man unit.

For Better Roads, use the Best in Equipment—Use a Littleford 84-HD Kettle.



84-HD Kettle with Hand Spray Attachment.



84-HD Kettle with Motor Spray Attachment.



## LITTLEFORD

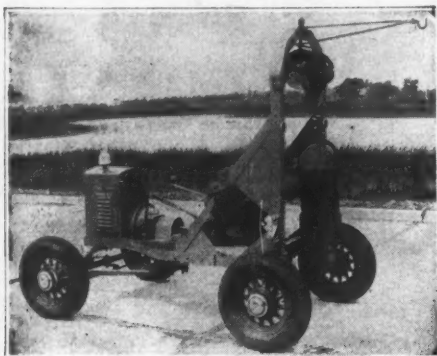
LITTLEFORD BROS., INC.

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# KEEP THOSE SEWERS OPEN!



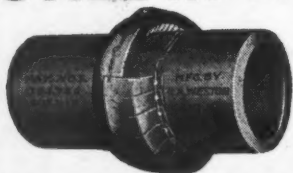
Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

You positively can keep the sewers of your city open with an OK Champion—the cleaner that does the entire job from street level. Dig-ups practically a thing of the past.

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**L.A. WESTON, ADAMS, MASS.**

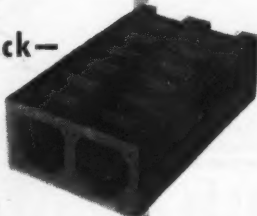
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stead of the bottom as is the case with the usual design. This variation prevents the grease from solidifying in the pipes since it drops from the top of the receiver onto the top of the liquor level. The discharge is from the bottom in the usual manner.

In sludge pumping, likewise, pneumatic ejectors are successful. Reports from two Pennsylvania cities, Sharon and New Castle, where they were installed for this purpose 15 years ago, show that in one case the check valves have not been opened for cleaning more frequently than once a year, due to the unique design of Shone check valves.

Withdrawal of sludge from settling tanks can be regulated without any restriction of sludge lines and the pumping rate of ejectors controlled to prevent formation of vortices in sludge body at all times.

## A New Process for Water Purification Developed by Mathieson

Mathieson Alkali Works, Inc.

60 East 42 St., New York 17, New York

The process for the removal of "chlorophenol" taste and odor was described by G. P. Vincent, of the Mathieson research and development department, at the recent meeting (September 15) of the American Chemical Society in New York.

As described by Dr. Vincent it consists of pretreatment with chlorine to sterilize the water, followed by treatment with chlorine dioxide to remove taste and odor caused by phenolic waste. The chlorine dioxide is generated by dispensing a sodium chlorite solution into the discharge line of a Wallace and Tiernan chlorinator. A constant dosage of 0.5 ppm available chlorine is maintained, which, it is claimed, is sufficient to remove all taste in a severely contaminated water.

Following experiments with the process on a laboratory scale, plane-scale operations were carried on at an auxiliary filter plant of the Niagara Falls Water Department. This plant, which supplies three to eight million gallons of water per day, has an "on-shore" intake which often became so contaminated with phenolic compounds, according to Dr. Vincent, that the customary method of treatment was inadequate. Variations in the degree of contamination aggravated the problem.

Three months of operation with the chlorine dioxide process demonstrated that it destroys phenolic taste and odor permanently and completely, Dr. Vincent stated. Additional advantages claimed for the process are considerably reduced chemical costs and simplified plant operations. The process is now used for purification of the entire Niagara Falls water supply.

## New High-Quality Slide Rule Announced

Charles Bruning Co., Inc.

4700 Montrose St., Chicago, Ill.

To fill the need for a high-precision, high-quality pocket slide rule which could be offered to engineers at a moderate price, the Charles Bruning Co. has just announced its new Bruning 2401, 5-inch Pocket Slide Rule.

In introducing this slide rule, the company stresses the fact that this is not a "duration substitute," but rather carefully made, smooth-working precision instrument designed for fast, easy operation.

A notable feature of the slide rule is the precision of its graduations. These graduations, being molded in, are an integral part of the rule—will not lose visibility through use. Graduations and numerals of the CI scale are in red to facilitate reading. Three screws in the back of the rule provide a simple adjustment for tension on the slide. The indicator is of glass and is easily replaceable in the event of breakage. This indicator is enclosed in frame of stainless steel that holds it firmly in place and eliminates "wobble."

It will sell for under \$4.00, complete with natural leather case and instruction booklet.



## Omega Machine Co. Moves to Providence, R. I.

Omega Machine Company, a Division of Builders Iron Foundry, removes its factory and offices to 9 Coddling Street, Providence, from Kansas City, Mo. L. E. Harper, President of Omega and a director of Builders Iron Foundry, will make his headquarters in their Chicago office in Peoples Gas Building, 122 S. Michigan Blvd.

The Omega Machine Company was established in Kansas City in 1928 by E. E. Harper. A complete line of volumetric and gravimetric dry feeders, lime slakers and related accessories which have become so well known, was developed, and under the continued leadership of L. E. Harper, Omega has made noteworthy strides. Today, its feeders are standard equipment in hundreds of municipal and industrial plants.

Many added manufacturing facilities are available to Omega in its new location. This move brings together three organizations, Builders-Providence, Inc., Omega and %Proportioners, Inc., each a specialist in its own field. Builders Iron Foundry was established in Providence in the year 1820. Builders' comprehensive line of flow meters, controllers, gages, etc., is distributed by Builders-Providence, Inc., a division of the parent company. %Proportioners, Inc., as engineers and manufacturers, produce a complete line of liquid chemical feeders employed in the treatment of water and sewage, as well as proportioning devices for industrial process blending and treating.

## Power Brushing in Maintenance Painting of San Francisco-Oakland Bay Bridge

Power brushing, in the form of a portable-tool-driven, steel-bristled cup-shaped brush, is reported the only method by which the acres of steel surfaces on the 7-mile-long San Francisco-Oakland Bay Bridge can be properly conditioned for the application of protective paint, a job that takes all the time of 15 to 20 men, working year in and year out.

This power-brushing unit, with which each man is equipped, removes fog and spray-deposited salt, also loose scale and paint, from the steel surfaces prior to repainting. This method is at least ten times faster than hand surface preparation, according to The Osborn Manufacturing Co., Cleveland, Ohio, suppliers of the particular brushes employed on the bridge.

The brush itself (see illustration) is of cup shape, approximately 3 3/4 inches in diameter, heavily-filled with coarse .020 S.A. wire, the wires extending 15/16-inch out of the cup. Operated in, and driven by, a portable hand tool, the brush spins at 4200 revolutions per minute. Rotating at this speed, with its coarse wires in contact with the steel surface, the unit speedily brushes away scale and leaves sound clean metal for reception of paint.

## Link-Belt Opens Warehouse in Spokane

The address is South 151 Lincoln St., one block south of the Davenport Hotel, convenient to local Spokane customers as well as customers who come from out of town. The postal zone is No. 8, and the telephone number, Riverside 7574. Homer A. Garland is in charge.

A representative line of power transmission, elevating and conveying equipment will be carried in stock, including such items as pulleys, V-belts, Ewart detachable and "H" Class chain, malleable iron buckets, "RC" flexible couplings, "RC" roller chain and sprockets, silent chain and wheels, motorized reducers, anti-friction bearings, babbit bearings, take-ups, etc.

Eastern Washington, northern Idaho and a western portion of Montana will be served from the new office, and it is planned to enlarge both the space and warehouse stocks as conditions warrant.

Mr. Garland, a native of Manistique, Mich., has been associated with the Link-Belt organization since 1922, having in that year entered the employ of the company's Seattle warehouse. He has served the "Inland Empire" for quite a number of years, first traveling out of Seattle.

## PUMPS THAT EXCEED THEIR PROMISES



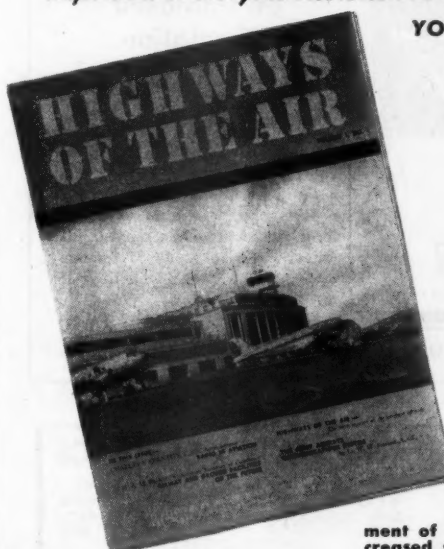
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### YOU SHOULD KNOW —

What is the "bottle-neck" in post-war expansion of civil aviation . . . See page 8

Why CAA is installing Ultra High Frequency radio ranges. See page 8

What anti-collision devices are being developed . . . See page 9

What electronic aircraft detectors are. See page 9

What can civil aviation learn from the A.A.C.S. See page 2

What goes into an instrument landing system . . . See page 11

What is approach control . . . See page 11

These questions and dozens of others of vital import to all those interested in the development of radio in aviation for increased safety of human life and property are discussed in the pages of

"HIGHWAYS OF THE AIR"



This issue is No. 1, Volume 1 — others will follow if you request them. Contents are authoritative—but non-technical—designed to inform the layman on a subject which is becoming of increasing importance.

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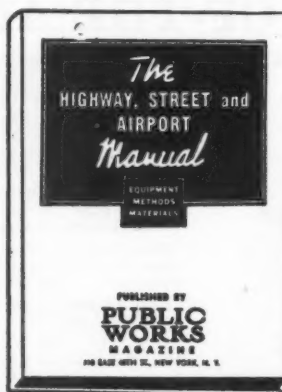


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**The Manual of Sewage Disposal Equipment  
and Sewer Construction is a year 'round exhibit  
of the latest equipment and materials.**

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## Fairbanks, Morse & Co. Buys Pomona Pump Firm

Fairbanks, Morse & Co. has purchased the Pomona Pump Company, a division of Joshua Hendy Iron Works in a \$4,000,000 transaction.

Announcements of the sale were made simultaneously in Chicago by R. H. Morse, Jr., general sales manager of Fairbanks-Morse, and in Sunnyvale, California, by Charles E. Moore, president of the Joshua Hendy Company. The sale was effective as of Sept. 2.

All physical assets, patents, and trade-marks of the Pomona and Westco pump lines were included in the transaction. The Pomona firm has plants in Pomona, California, and St. Louis, and has been doing approximately 7 to 8 million dollars worth of business annually.

No change in personnel are contemplated and, according to Morse, Arnold G. Brown, general sales manager of the Pomona Company, becomes assistant manager of the Fairbanks-Morse Pump Division in charge of Pomona and Westco products. Distribution and sales will continue under Brown's direction.

In announcing the purchase, Morse said: "Fairbanks-Morse & Co. recognizes its responsibility to serve distributors and dealers. Towards that end plans already have been made to increase manufacturing facilities at the earliest opportunity."

The Pomona open Impeller turbine pumps of the water lubricated type have a highly successful record in irrigating, and municipal services. The Westco line is large for industrial and home water system uses.

Morse pointed out that acquisition of the Pomona company will augment the Fairbanks-Morse line of pumps and that this is an addition to the Fairbanks-Morse pumps now being manufactured.

Hereafter the Pomona pumps will be known as Fairbanks-Morse-Pomona, and Fairbanks-Morse-Westco line



Reginald F. Hayes

## New General Sales Manager for Hydraulic Development Corporation

The Corporation announces that after October 1, Reginald F. Hayes will be in charge of its offices at 50 Church Street, New York City, as General Sales Manager. Mr. Hayes has been with the company since 1928 and has covered the New England territory since 1936.

## New Athey Folder

Athey Truss Wheel Co., 5631 W. 65th St.,  
Chicago, 38, Illinois.

A new six page folder entitled "To Help You Maintain Better Highways" featuring the Athey Force-Fee Loader has been completed recently and is ready for release.

The folder illustrates time and labor saving methods



of removing and salvaging surplus materials on highway maintenance and construction through the use of the new self-propelled Athey Force-Feed Loader.

### A Tribute to Col. Joseph A. Le Prince

At its meeting, Aug. 7th, in Memphis, The Engineers' Club held up to public view the achievements of one of its fellow engineers. The meeting was held as a tribute to Col. A. Le Prince, citizen of Memphis and engineer who has devoted his life to the control and eradication of yellow fever and malaria. It was on the occasion of his 69th birthday, and in recognition of his lifelong work in the field of public health that the Engineers' Club conferred on Col. Le Prince its honorary membership.

Presiding at the meeting, Dr. C. B. Weiss introduced Col. Le Prince, who acknowledged the rising ovation of the Club with the admission that it was a very great surprise to him. "Yellow Jack has given me a lot of surprises," said Col. Le Prince, "but none of them were as great as this."

Mr. H. G. Stromquist, Sanitary Engineer of the TVA at Chattanooga, introduced the speaker, Dr. Felix J. Underwood, State Health Officer of Mississippi and president of the Am. Public Health Assn.

Speaking of the achievements and lifelong work of Col. Le Prince in the control of yellow fever and malaria, Dr. Underwood stated that a flower in a man's buttonhole is worth more than bouquets on his grave. "We are gathered here," said Dr. Underwood, "to put a flower in Col. Le Prince's buttonhole. If Col. Le Prince had taken as many lives in his campaign as he has saved," he continued, "he would be the most decorated of military heroes. But he is a man of science, and scientists are not honored and decorated as are military heroes."

Col. Le Prince arrived in Havana as the darkness of discouragement was falling on the hopes of keeping the island. The army had lost more men to this disease than to Spanish bullets. Walter Reed had not yet presented proof of the mode of propagation of yellow fever, so Le Prince had to proceed empirically. He divided the city into 20 districts and systematically fumigated the homes of each victim. From a death trap, Havana became a health resort. Moving on to the Canal Zone the same tactics were applied, and by November, 1905, the plague was licked.

Continuing in the Panama Canal Zone, he served as health officer until 1914 when he returned to the states, where he engaged in malaria control work in the Mississippi and Tennessee valleys until his retirement in 1939.

Concluding the meeting, Dr. Weiss read excerpts from letters from leaders in public health in the nation, including Brig. Gen. Samuel S. Simmons, Army Medical Corps, Rear Admiral Charles S. Stevens, Navy Medical Corps, and Thomas E. Parran, United States Public Health Service. Col. Le Prince was then presented with an illuminated scroll and card symbolizing his honorary membership in the Engineers' Club.

### Camp Acquires Ellsworth's Engineering Practice

Thomas R. Camp, Consulting Engineer, has acquired the consulting practice of the late Samuel M. Ellsworth, and has moved to the offices formerly occupied by Mr. Ellsworth at 6 Beacon Street, Boston 8, Mass.

### Worthington Appoints W. J. Van Vleck Manager of Atlanta District Office and C. W. Camp as Consulting Electrical Engineer

Worthington Pump and Machinery Corporation, 744 Broad St., Newark 2, N. J., announces the appointment of William J. Van Vleck as Manager of its Atlanta office, succeeding Edward Stauverman, who, after many

(Continued on page 78)

## C.H.&E.

**SELF-PRIMING  
CENTRIFUGAL PUMPS**

Complete line of efficient, dependable low cost pumping units, built in sizes 3000 to 125,000 gallons per hour. Non-clog impeller, large pump case for quick positive automatic priming.

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(Continued from page 76)

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## CONVENTIONS

Oct. 11-14... Federation of Sewage Works Association, William Penn Hotel, Pittsburgh, Pa.

Oct. 12-14... Pennsylvania Sewage Works Association, William Penn Hotel, Pittsburgh, in conjunction with the Federation of Sewage Works Associations.

Oct. 17-19... Southwest Section of American Water Works Association, Stephen M. Austin and Driskill Hotels, Austin, Texas.

Oct. 24-26... California Section, American Water Works Association, Biltmore Hotel, Los Angeles.

Oct. 30-31... Annual meeting of Missouri Water and Sewerage Conference, Tiger Hotel, Columbia, Mrs. Warren A. Kramer, Sec.-Treas.

Nov. 14-15... South Dakota Water and Sewage Works Conference, Watertown, S. D. It was originally planned for Sept. 19-20.

Nov. 22-25... Highway Research Board annual meeting at Netherland Plaza Hotel, Cincinnati, Ohio.

Jan. 16-19, 1945... The 42nd Annual Meeting of the American Road Builders' Association, Stevens Hotel, Chicago. Plans for launching the great highway program in history will be considered from every angle.

### Caterpillar Lists All Its Products in a New 20-Page Booklet

"The Complete Line of 'Caterpillar' products," a new 20-page booklet published by Caterpillar Tractor Co., Peoria, Illinois, illustrates the complete line of 'Caterpillar' Diesel Engines, Tractors, and Road Machinery for earth-moving. Described and pictured are the important jobs these machines are doing. For a free copy of this interesting and informative booklet, ask for form D-41.

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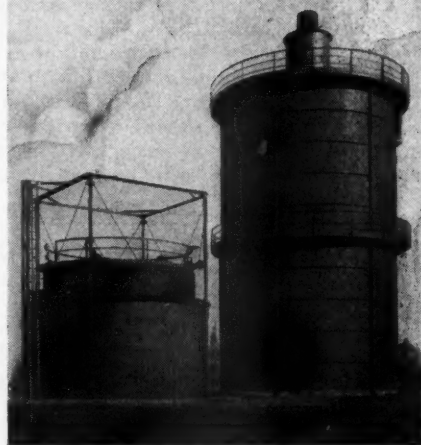
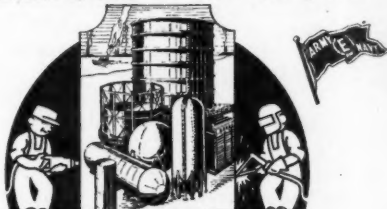
Storage of digester gas during peak periods of production can greatly extend the economies of its use by affording a reserve supply for continuous use. We are one of the foremost designers and producers of both wet and dry seal gas holders in capacities from 100 to 21,000,000 cu. ft. In many instances the storage of gas in a dry state offers distinct advantages. It will pay you to investigate both types, and get the facts on the record of Stacey Brothers Equipment. Write today.

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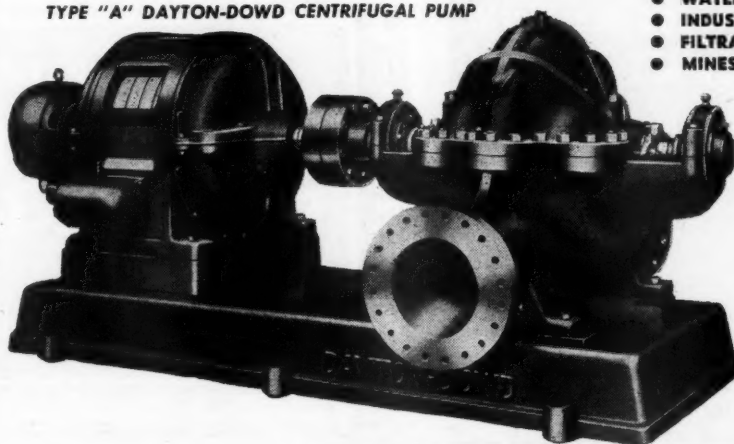
A Stacey Brothers 5,000 cu. ft. Wet Seal Gas Holder and 30,000 cu. ft. Stacey-Klonne Dry Seal Gas Holder installed in an Ohio city.

# Stacey Brothers

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# DAYTON-DOWD

Turbine Pumps • Centrifugal Pumps

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years of association with Worthington, has resigned to engage in another line of business.

Mr. Van Vleck entered Worthington's employ in 1924 as a member of the student group. Since 1938 he has been assistant manager of the Philadelphia District Office. Prior to that assignment he was application and field service engineer in the same district. C. W. Camp, formerly with Crocker-Wheeler Electric Manufacturing Company for 38 years, specializing in application engineering and now associated with Worthington as Consulting Electrical Engineer. A former executive member of the National Association of Electrical Manufacturers, Mr. Camp brings a wide background of experience in the electrical industry to his new work with Worthington's Public Utilities Department. He replaces the late Harry Wood and will assist in solving electrical application problems for all Worthington sales divisions and district offices. His services will also be utilized by the company's manufacturing departments.

### David Waxman Dies

*Shell Oil Executive and  
a Director in Asphalt Institute*

David Waxman, manager of the asphalt sales department of the Shell Oil Company at 50 West Fiftieth Street, New York, and a director and former chairman of the executive committee of The Asphalt Institute, died on August twenty-ninth in the White Plains Hospital at the age of 46.

Mr. Waxman was graduated from the University of Pennsylvania with a degree in civil engineering in 1919. After working for the Pennsylvania State Highway Department and the construction division of the Army Quartermaster Corps, he served as chemical engineer for the Pittsburgh Testing Laboratories at Birmingham, Ala.

In 1925-26, he did engineering work in Atlanta, Ga., for the Sam E. Finley Company, then became an asphalt salesman for Shell at its New Orleans office. He was ap-

pointed manager of the company's asphalt sales department in 1929, with offices in St. Louis, and in 1940 came East when the headquarters were moved to New York.

### Northrop & Company Reorganized and Making Bond-O Joint Compound

Northrop & Company, Inc., of 50 Church Street, New York City, dealers in Water Works Specialties and Supplies, announces the purchase of a plant at Spring Valley, N. Y., and is offering Bond-O, a sulphur base jointing compound for cast iron water mains.

Guy C. Northrop, President of Northrop & Company, Inc., entered the water works business in January 1919 selling water meters for eight years. In 1927 he entered the employ of Hydraulic Development Corporation to promote the sale of Hydro-Tite. For the last 16 years he has acted as General Sales Manager. Mr. Northrop is a past President of the Water Works Manufacturers Association and represented this group as Director of the American Water Works Association in 1936 and 1937. He recently resigned his position with Hydraulic Development Corporation to devote his entire time to Northrop & Company. In addition to the manufacture and sale of Bond-O, Northrop & Company will continue its line of Water Works Specialties and Supplies.

The following water works men, all of whom have been in the joint compound industry for many years, are associated with this company:

Ralph L. Kelly will travel his old territory of Pennsylvania and Virginia. He will also devote part of his time to the New England States, where he traveled so many years when formerly in the meter business.

Bert Seeholzer, Jr., will, in the near future, be calling on his old friends in New York and New Jersey to tell them about Bond-O.

Vic Sohle of Dallas, Texas, who represents R. D.

(Continued on page 82)

**Known Around the World  
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Water Treatment Equipment**

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ROBERTS FILTER MFG. CO.  
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Equipment and  
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These booklets are FREE but distribution is restricted to those actively engaged in engineering or construction. Use the coupon or write the manufacturer direct, mentioning PUBLIC WORKS.

### Construction Materials and Equipment

#### Airport Radio Traffic Control

6. "Highways of the Air" is a new and valuable booklet available for engineers and officials interested in radio traffic control for airports. Illustrated and non-technical. Address: Radio Receptor Co., Inc., 251 West 19th Street, New York 11, N. Y.

#### Cold Mix Plants

15. New catalogs and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

#### Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

#### Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

#### Concrete Curing

33. 64-page manual of concrete curing with calcium chlorides. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

#### Concrete, Early Strength

38. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

#### Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilling and Non-Tilt types, from 3½ to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

#### Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armor Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

#### Generators

80. Two portable generators, one for AC and the other for DC current are described in new bulletin issued by Homelite Corp., Port Chester, N. Y. Commonly used for operating electrical equipment in planes, tanks and trucks, or to charge batteries or to supplement batteries for starting main engines, etc.

#### Finishing Machines

96. Flex-Plane Finishing Machines around the world. Handsome new folder shows various models in action. One ma-

chine combines screeding and longitudinal and transverse contraction joint installing. Available from Flexible Road Joint Machine Co., Warren, Ohio.

#### Joints, Expansion

103. Joint Data. Expansion and contraction ribbon joint installers. Flexplane units and finishers. Catalog illustrates how machine installs both longitudinal and transverse joints rapidly. Flexible Road Joint Machine Co., Warren, Ohio.

#### Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

#### Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee 10, Wis.

#### Power Shovels

113. The full line of Osgood power shovels, cranes, draglines, and clam shells is illustrated in detail and described in comprehensive booklets issued by The Osgood Co., Marion, Ohio.

#### Pumps

115. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Port Chester, N. Y.

116. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

117. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

118. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

119. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet

showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

120. "Humdinger" 2- to 8-inch self-priming portable pumps. A 23-page illustrated booklet giving full details. Address: Ralph B. Carter Co., Hackensack, N. J.

#### Road Building and Maintenance

128. Two powerful Gallon motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Gallon Iron Works & Mfg. Co., Gallon, Ohio.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

130. BG Maintainer, a powerful, speedy, low-priced machine for light road maintenance. Write for folder. Huber Mfg. Co., Marion, Ohio.

131. Speed Scoop. A versatile small scraper unit, ideal for emergency repairs. Illustrated folder issued by Huber Mfg. Co., Marion, Ohio.

#### Rock Drill Maintenance

132. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland 5, Ohio.

#### Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio.

141. Three-Wheel Rollers. Huber Automotive type rollers in 5 to 8 ton sizes and Huber 10 & 12 ton diesel rollers. New bulletins give full details and specifications. Huber Mfg. Co., Marion, Ohio.

142. Tandem Rollers. Variable weight tandem roller with three speeds forward and reverse for new highway surfacing and old road conditioning. Huber Mfg. Co., Marion, O.

#### Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

#### Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc. — 4 complete catalogs of latest equipment in one cover, issued by The Jaeger Ma-

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#### Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich., for Bulletin No. 29.

#### Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia 7, Pa.

#### Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York 54, N. Y.

### Street and Paving Maintenance

290. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments, with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. These are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, O.

### Fire Apparatus

300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

### Snow Fighting

#### Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

351. Anderson automatic trip reversible and one-way snow plows for all sizes of trucks and Anderson side walk snow plows are illustrated and described in new bulletin. Anderson Engineering Co., 21 Charles St., Cambridge, Mass.

#### Ice Control

352. Fast, self-feeding spreaders for ice control and seal coating that replace end gate on any dump truck, operated by driver of truck, are illustrated in new bulletin issued by Flink Co., 506 Vermillion St., Streator, Ill.

353. The new Flink sand spreader attachment that spreads sand faster from thinnest surfacing up to 2" layers and keeps a perfect edge is described in bulletin sent promptly by Flink Co., 506 Vermillion St., Streator, Ill.

### Sanitary Engineering

#### Aero-Filter

356. Aero-Filter Design Data is given in a new 32-page catalogue. It contains information on Advantages of Aero-Filter Process, Single Stage vs. Multi Stage Treatment, Filter Loadings, Rates of Flow and Results, Filter Depths, Recirculation, Sewage Pumps and Pump Control. Approximately 15 pages of blue prints are included in this instructive catalogue. Write Lakeside Engineering Co., 222 W. Adams St., Chicago 6, for a copy.

#### Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia 42, Pa.

358. Air Valves are the subject of Rensselaer Bulletin Q in which Air Release, as well as Air and Vacuum, types are described. Address: Rensselaer Valve Co., Troy, N. Y.

#### Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

#### Activation and Aeration

367. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester 6, Mass.

#### Blowers

370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

#### Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioners, Inc., 96 Coddling St., Providence 1, R. I.

#### Cleaning Sewers With Own Forces

385. A 20-page booklet describes and illustrates a full line of sewer cleaning equipment—Rods, Root Cutters, Buckets, Nozzles and Flushers. Write W. H. Stewart (Pioneer Mfr. since 1901), Jacksonville, Fla., or P. O. Box 767, Syracuse, N. Y.

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles 34, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

388. Sewer Scooter, the only 100% self-propelling sewer cleaning machine, that removes sand, gravel, rocks, bricks, mud, grease, broken rods, metals, etc., from sewers is described in new illustrated bulletin. Write J. C. Fitzgerald, P. O. Box 289, Coral Gables, Fla.

#### Consulting Engineers

389. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

#### Feeders, Chlorine, Amonia and Chemical

391. Feeders of all types including Hypochlorinators, Reagent Feeders, Dry Chemical Feeders, Chlorinators and Ammoniators are available in a wide range of capacities for feeding all of the usual chemicals used in sanitation practice—manufactured by Wallace & Tiernan Co., Newark 1, N. J.

392. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioners, Inc., 96 Coddling St., Providence 1, R. I.

399. Pulsafeeders. A flow-proportional liquid chemical feeder, reciprocating type, fluid motor driven. Operating parts completely isolated from the chemical being fed. Micrometer adjustment. For feeding against high or low pressure. Wilson Chemical Feeders, Inc., 211 Clinton St., Buffalo 4, N. Y.

#### Filters, Vacuum

403. For bulletins on Vacuum Filters for dewatering primary, activated, digested or chemical sludge, write The Conkey Co., 420 Lexington Ave., New York 17, N. Y.

#### Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 438.

407. Fire hydrants which are flood-proof, easy to operate and service are described in Rensselaer Bulletin W, formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

408. For a concise description and illustrations of the Improved MUELLER-COLUMBIAN Fire Hydrants, complete parts list and full directions for ordering—get the new folder just issued by Mueller Co., Chattanooga 1, Tenn.

#### Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

#### Gas Holders and Digesters

411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

412. If your plans call for economical storage of digester gas, write for bulletin on Stacey Brothers All-Welded, High Pressure Spheres that combine safety with pleasing appearance. Stacey Brothers Gas Constr. Co., 5535 Vine St., Cincinnati 16, Ohio.

#### Gates, Valves, Hydrants

413. Gate, flap and check valves; floor stands and fittings. New catalog No. 34 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

415. See listing No. 438.

416. Check valves of the Clear-Way, Quiet-Closing type which eliminate "Slam" are described in Rensselaer Bulletin V. Made in expanding outlet type, as well as straight-thru type, for bolting direct to pump discharge. Address: Rensselaer Valve Co., Troy, N. Y.

417. Rensselaer Gate Valves of high tensile strength, corrosion resistant iron are described in Rensselaer Bulletin X. Address Rensselaer Valve Co., Troy, N. Y.

418. A new four-page folder on MUELLER-COLUMBIAN Gate Valves gives construction details, shows various type of gear drive mechanism available, and has handy check list of dimensional data. Write Mueller Co., Chattanooga 1, Tenn.

419. Double-disc gate valves; hydraulically operated valves; air, check, flap and mud valves. Fire hydrants with sliding gate or balanced valve. A 32-page catalog. Ludlow Valve Mfg. Co., Inc., Troy, N. Y.

#### Gauges

421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

#### Manhole Covers and Inlets

429. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Houl. and Indiana Ave., South Bend 23, Ind.

#### Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquid containing suspended solids like sewage. Eliminates corrosion, clogged pipes, etc. Write Builders-Providence, Inc., 9 Coddling St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thorsen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Coddling St., Providence 1, R. I.

#### Meters, Water

434. Six types of iron case cold water

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435. in stand frost-pro All par models letins, Co., 282  
437. Pipe, Cas water, & Super-de pit-cast hanged to suit r Foundry  
438. a well th full spec of Sand drants, C will be e 400 Ches 439.  
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eters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh 8, Pa.

435. "Watchdog" water meters, made in standard capacities from 20 GPM up; frost-proof or split case in household sizes. All parts interchangeable with present models of same manufacturer. For bulletins, write Worthington-Gamon Meter Co., 282-296 South St., Newark, N. J.

#### Pipe, Cast Iron

437. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

439. McWane Precast Concrete Joint Cast Iron Pipe, in all sizes from 1½ through 12 inches for water and sewage, equipped with various type of factory-made joints, as well as B. & S. joints. Illustrated booklet issued by McWane Cast Iron Pipe Co., Birmingham, Ala.

#### Pipe, Lock Joint

440. Lock Joint Reinforced Concrete Sewer Pipe, Pressure Pipe, Culvert Pipe, Centrifugal Pipe and Subaqueous Pipe is described and illustrated in bulletins available from Lock Joint Pipe Co., Ampere, N. J.

#### Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

#### Pipe Joints, Water

443. Bellmaster Joints for simpler, faster, easier joining of cast iron pipe are illustrated in a new folder that gives full data on this self-contained mechanical joint. Write Dresser Mfg. Co., Bradford, Pa.

#### Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement-tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

#### Pipe Joint Compounds

446. The uses of Tegul-Mineralad for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

#### Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

448. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; also sump and bilge pumps. Dayton-Dowd Co., Quincy, Ill.

#### Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Well Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis 8, Tenn.

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles 31, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

452. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

#### Meter Setting and Testing

454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

#### Screens

456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

#### Sludge Drying and Incineration

458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagrammatic outline of various plant designs. 48 pages. Address: Morse Boulder Destructor Co., 205-P East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from silicon Carbide and "Fireclay" Corebustors for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

460. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York 5, N. Y.

#### Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

463. Water Softening. The use of the Spaulding Precipitator to obtain maximum efficiency and economy in water softening is described in a technical booklet. Permutit Co., 330 W. 42nd St., New York 18, N. Y.

#### Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

#### Stand-by Motors

467. Buffalo stand-by motors for generators or pumping units are covered in illustrated specification sheets sent promptly by Buffalo Gasoline Motor Co., Dept. PW, Buffalo 3, N. Y.

#### Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

#### Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

#### Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described

in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

477. All-steel Rotary Distributors, correctly designed for the small and medium sized sewage plants, are the subject of a new, well illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill. This booklet also covers distributors for various types of high-rate trickling filters.

478. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

481. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

483. A combination mechanical clarifier and mechanical digester. The Dorr Clarigester is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Preflocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

487. The complete line of Jeffrey equipment for water, sewage and industrial waste treatment is illustrated and described in a handsome, new, 40-page catalog just issued by The Jeffrey Mfg. Co., 947-99 North Fourth St., Columbus 16, Ohio.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2438 Wolfram St., Chicago 18, Ill.

489. "Carter Controlled Flocculation" is title of illustrated folder available on request from Ralph B. Carter Co., Hackensack, N. J.

490. Small type Conveyor Sludge Collector and Skimmer, Grit Collector, Aero-Filter and other equipment for small sewage treatment plants are described and illustrated in bulletins available from Chain-Belt Co., 1722 West Bruce St., Milwaukee 4, Wis.

#### Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh 12, Pa., for free copy.

493. Full details about Armco Filter Bottom Blocks for Trickling filter floors, includes drawings illustrating construction details. Complete bulletin available from The Bowerston Shale Co., Bowerston, Ohio.

#### Valves (See Gates, Air Release, etc.)

#### Water Treatment

495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

#### Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio.

### Looks Like New All the Time

One coat of Green Paint makes MURDOCK Outdoor Water Devices look like new. Paint them THIS month. (Polish bowls of Drinking Fountains.)

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## FORD

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WABASH, INDIANA

### Northrup & Co.

(Continued from page 78)

Wood Company of Philadelphia, will also represent Northrup & Company, Inc., in the sale of Bond-O in the Southwestern States. Mr. Sohle is making arrangements to stock Bond-O in Dallas for quicker distribution and better service.

Ben F. Crabbe of Birmingham, Alabama, accepted a franchise for the sale of Bond-O for Northrup & Company, Inc., throughout the Southwestern States, and is now arranging for a warehouse stock of Bond-O to better serve his many customers.

E. Harold Johnson of Orlando, Florida, who handles a line of water works materials throughout Florida, will represent Northrup & Company, Inc.

### A New Engineering Catalogue Describing Sewage Treatment and Water Works Equipment

*Coldwell-Wilcox Division*

*Krajewski-Pesant Manufacturing Corp.*  
227 Fulton St., New York 7, N. Y.

This catalogue is intended to fill the gap between the manufacturer and the engineer in regard to equipment described in it, which is in part as follows: Check Valves, Sludge Air Lifts, Trash and Bar Screens, Hydraulic and Pneumatic Valve Operating Equipment, Pneumatic Ejector System, Rising Tube Sewage Regulators, R-W Type Revolving Fine Screens, Mechanical and Hydraulic Sluice Gates and Misc. Water Works and Sewage Equipment.

Section A—14 pages are devoted to Sluice Gates specifications and design followed by 16 full page drawings and detailed information on Rectangular, Circular Opening Square Frame Sluice Gates and typical installations.

Tide Gates (Flood Gates, Check Valves), Shear Gates, Bar Screens, Fine Screens, Continuous Hydraulic Sludge Feeders, etc., are described and illustrated in the same way.

There is a wealth of useful information for engineers in this catalogue. Copies are available upon request to the manufacturers.

### Unique Dealer Meeting Scheduled by E. D. Etnyre & Co.

A four-day sales meeting of dealers from all over the country will be held by E. D. Etnyre & Co. of Oregon, Ill., beginning October 4th.

Starting with a Bar-B-Que Dinner, highlighted by musical Western entertainment on the 5th, the dealer organization will attend a national sale of thoroughbred Hereford cattle sponsored by Etnyre, Inc., a subsidiary of E. D. Etnyre & Co. A dinner Thursday night will be followed by an evening of entertainment, with the famous radio organization "The Northerners" as the headliners.

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